The Mining Journal

Established 1835 — Railway & Commercial Gazette

Vol. CCXLI No. 6166 — LONDON, OCTOBER 23, 1953 — PRICE 8d

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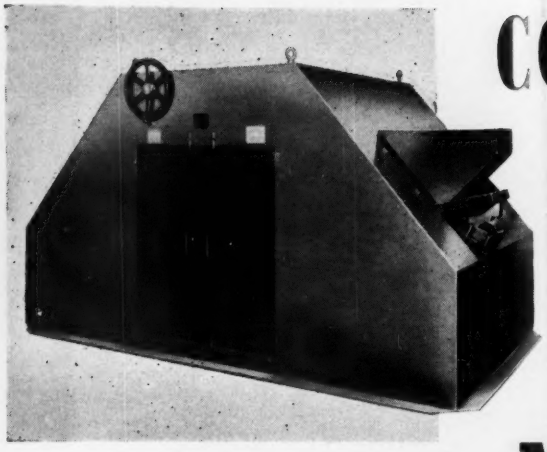

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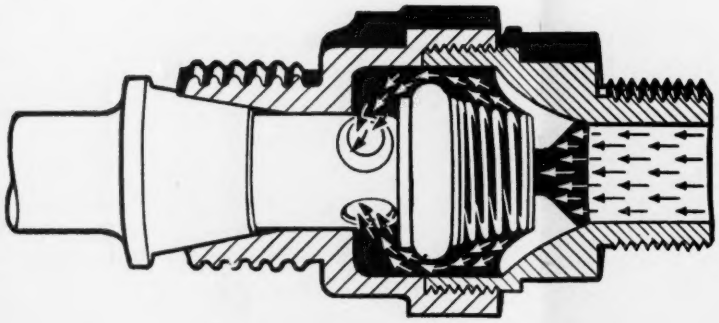

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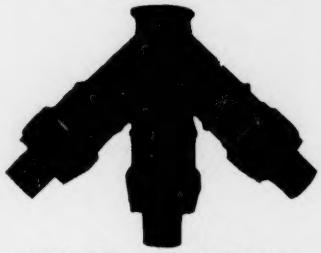

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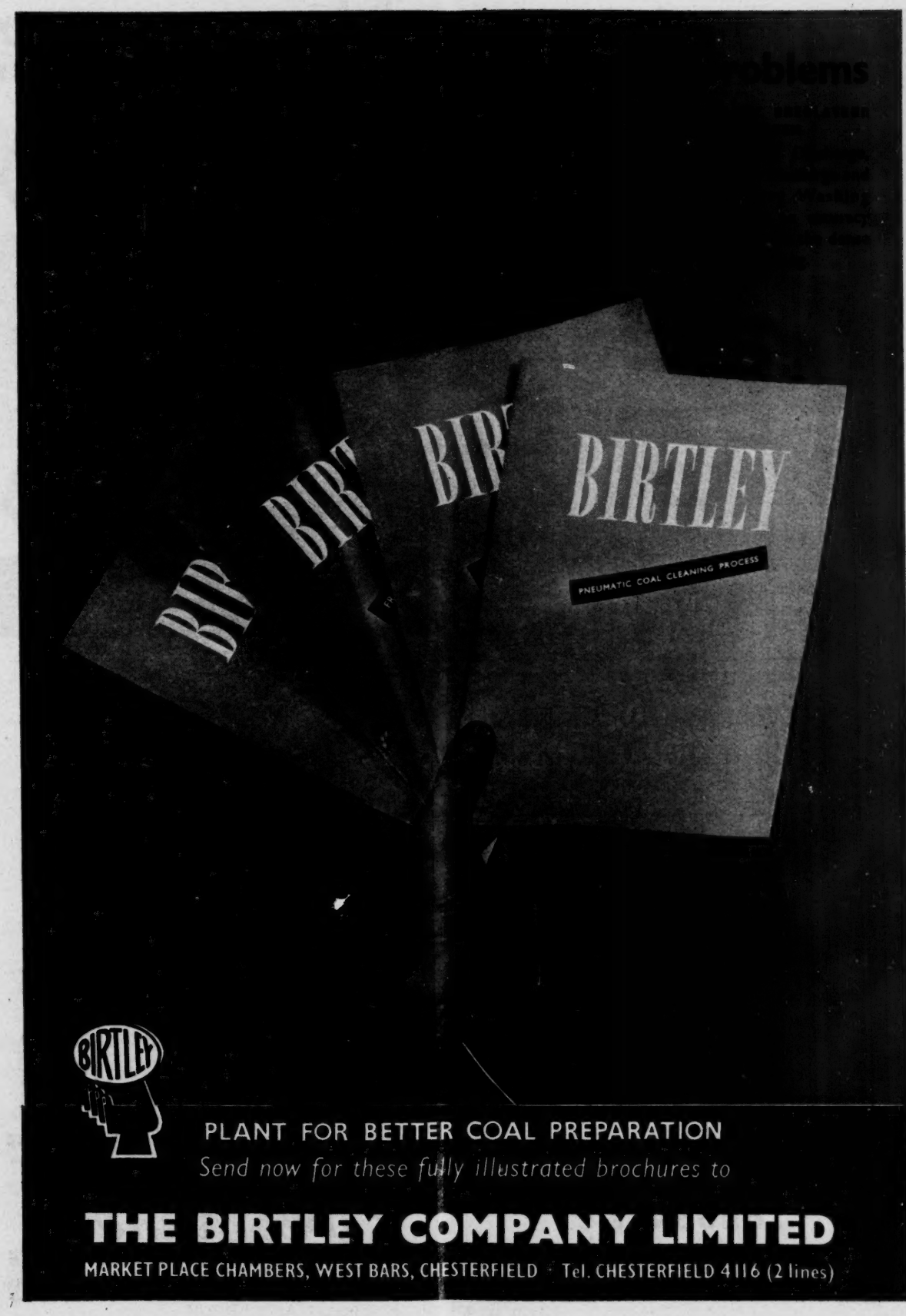
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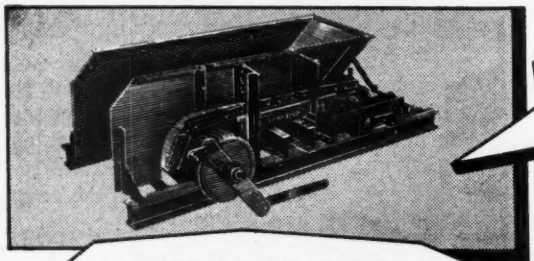

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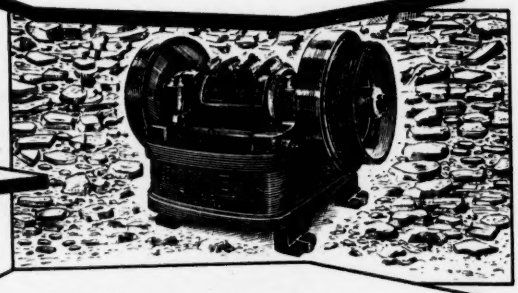

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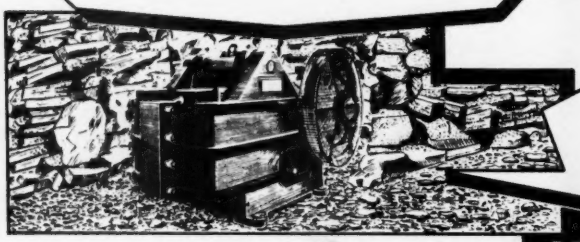

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TENSILE STRENGTH		Izod Impact ft.-lb. min.	En No.	Type	En No.	Type
t.s.i.	kg/mm²					
40–60	63–94	50	37	5% Ni	—	—
45 min.	71	40	33	3% Ni		
"	"	"	34	2% Ni-Mo (lower C.)		
"	"	30			351	¾% Ni-Cr
"	"	25			361	"15" carbon low-alloy
55–75	86–118	35	36T	3% Ni-Cr		
55 min.	86	"	325	Low Ni-Cr-Mo		
"	"	25	35	2% Ni-Mo (higher C.)		
"	"	20			352	1% Ni-Cr
"	"	15			362	"20" carbon low-alloy
65–80	102–126	30	36V	3% Ni-Cr		
65 min.	102	"	38	5% Ni		
"	"	20			353	1¼% Ni-Cr
"	"	—			363	"25" carbon low-alloy
75 min.	118	20			354	1¾% Ni-Cr
85 min.	134	25	39A	4¼% Ni-Cr		
"	"	"	39B	4¼% Ni-Cr-Mo		
"	"	"	320	2% Ni-Cr-Mo		
"	"	"			355	2% Ni-Cr-Mo (low-Cr)

Eight new specifications for case-hardening steels have been issued by the British Standards Institution. The new steels are intended to replace, as an emergency measure, the more highly alloyed case-hardening steels in current use.

The table gives details, based on mechanical properties, of the new economy steels which are alternative to the standard alloy steels. Many of these standard steels will again be available when the present situation has passed.

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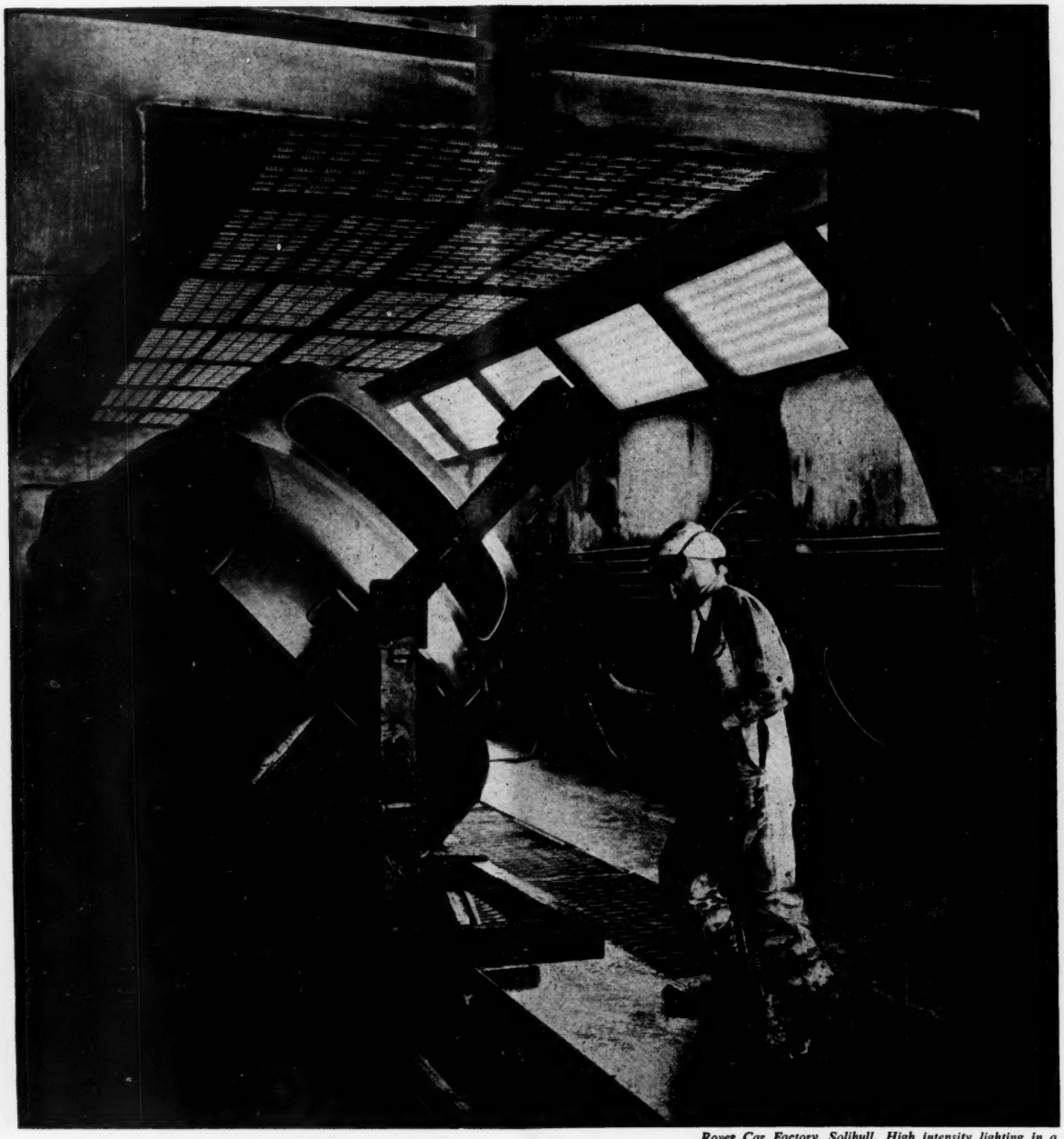

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Tailored for the job

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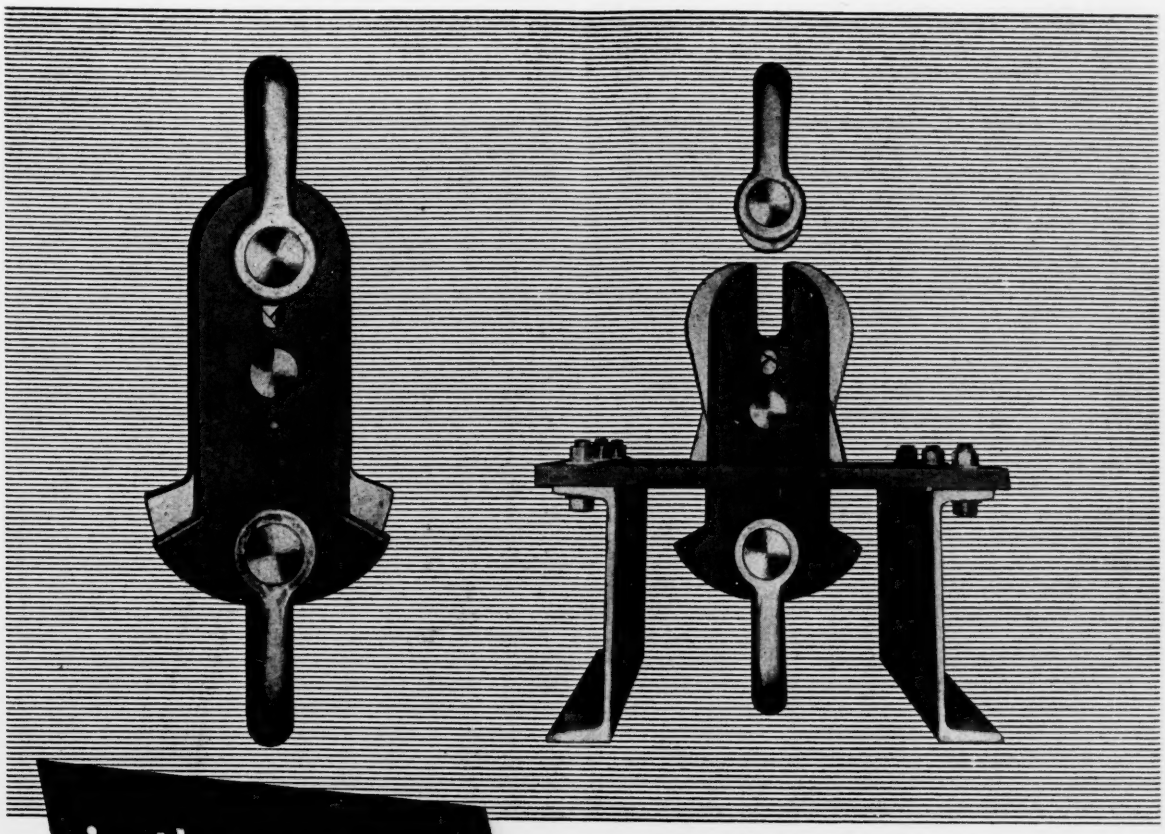

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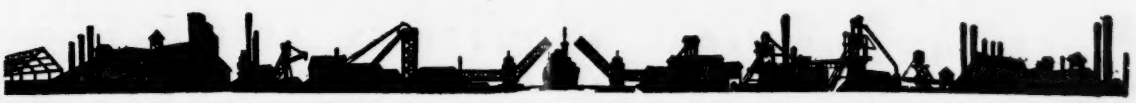

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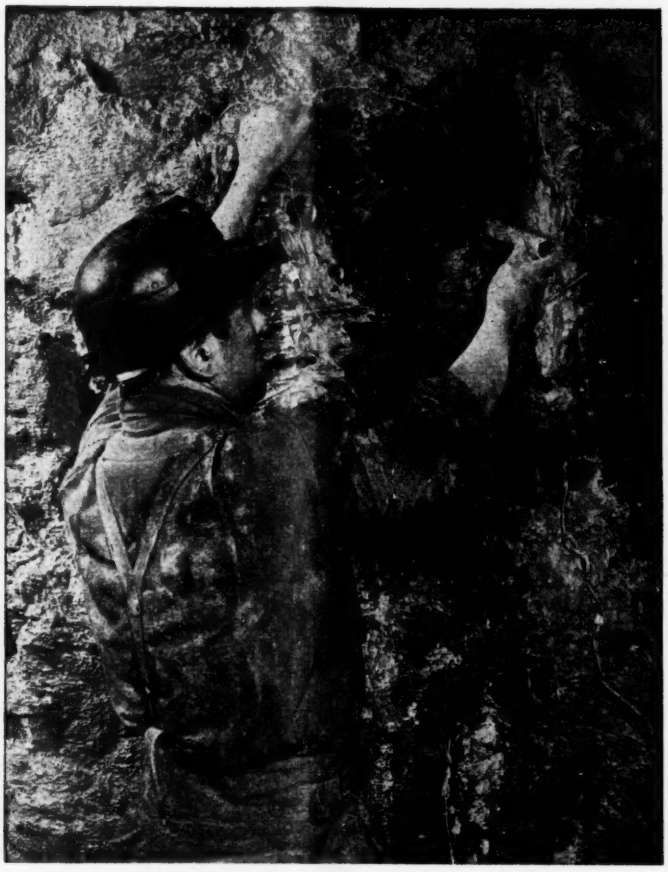

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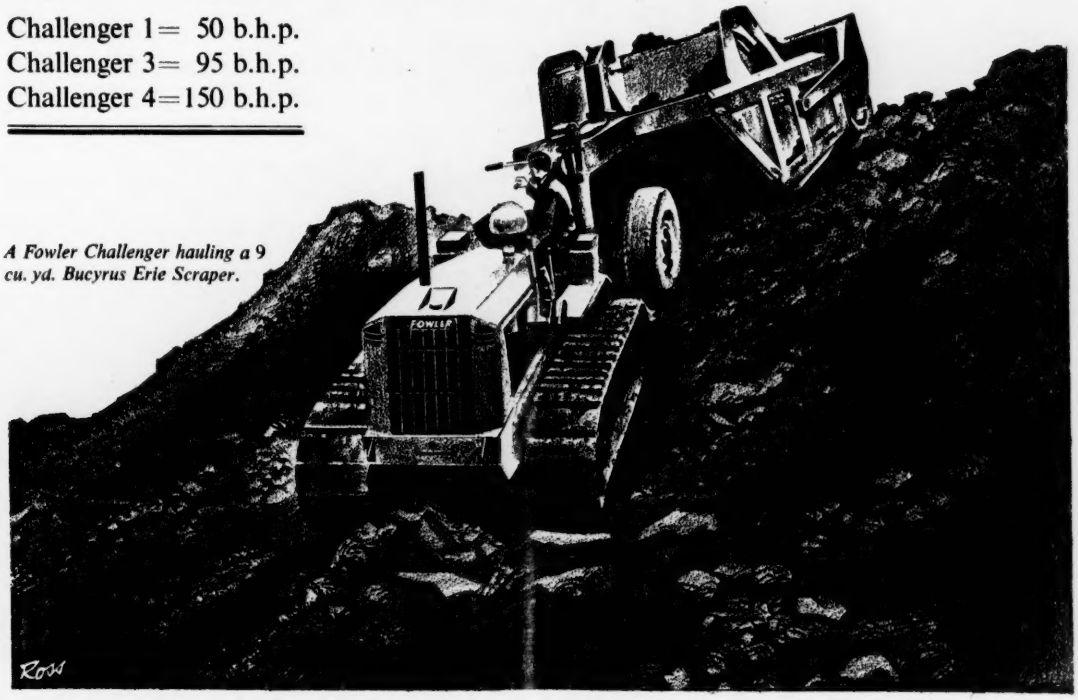

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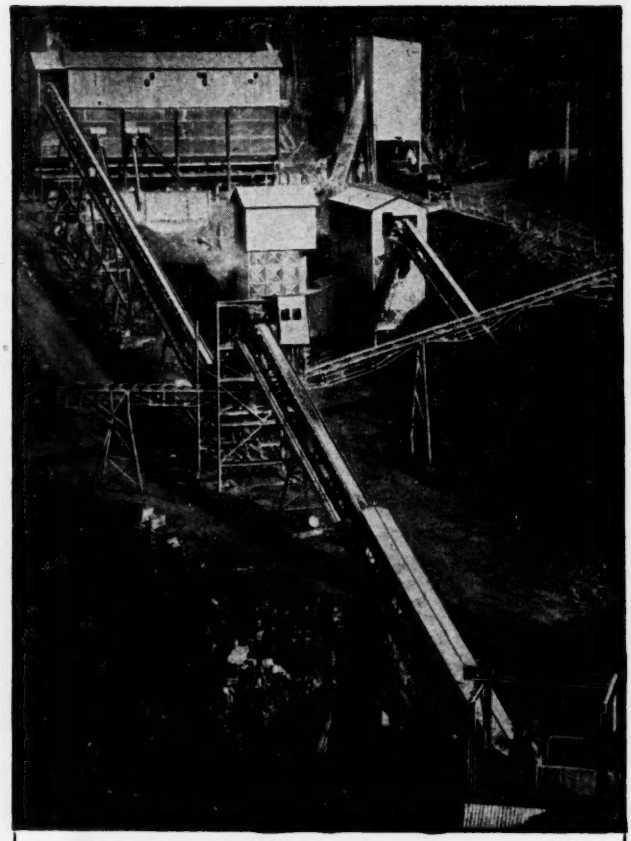

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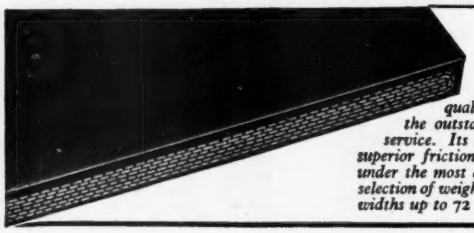

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The Mining Journal

Established 1835

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NOTES AND COMMENTS

Some Light on the Nationalization of Bolivian Mines

Considering the magnitude and completeness of the nationalization of privately owned mining enterprises in Bolivia effected by the decrees of June 2 and October 31 of last year, the proceedings of the Revolutionary Government in Bolivia have received scanty notice. The companies principally concerned, the Patiño Hochschild and Aramyo interests, have for reasons which can be readily understood abstained from a reasoned exposition of their case while the Bolivian Government itself has relied on wild and general charges of political banditary, incitement to mass-murder, and fraud on a huge scale.

It is, therefore, of interest to peruse the statement of Sr. Carlos Aramayo made at the 33rd Ordinary Meeting of the Compagnie Aramayo de Mines en Bolivia S.A. held in Geneva last month. While a revolutionary Government, such as that now established in Bolivia, may well consider itself superior to any purely legal considerations, it is not unimportant to consider what basis in law exists for the drastic nationalization measures put in force. The Bolivian Ambassador in the U.S., Sr. Victor Andrade, stated in an address delivered in New York last November that the Government has always held the title to the tin and other minerals and that the mining groups operated the mines as concessions. This contention is challenged by Sr. Aramayo, who as a Bolivian citizen occupying at one time the position of Bolivian Ambassador to this country, is clearly entitled to be heard. He points out that while the metalliferous subsoil is the property of the State, that Authority granted its exploitation to private undertakings on terms laid down in the mining code and that this provided for absolute complete and perpetual proprietary rights to any concession granted. Even were the State entitled to expropriate concessions the constitutional and legal guarantees, including full adequate favourable compensation, are required. We have, of course, no information how far the Revolutionary Government purports to have changed the fundamental constitution but the matter is probably of little practical significance, as according to a statement by Sr. Perez del Castillo, Bolivian Minister Plenipotentiary in Washington, the laws and courts of the country will settle such questions.

Despite earlier statements that the Bolivian Government had no intention of paying any compensation at all, and in fact claimed that the Aramayo Company alone owed the State the sum of £B295,000,000, the Corporación Minera de Bolivia has agreed to pay certain percentages on the value of the tin, silver, lead, zinc and other products from the Aramayo properties which Sr. Aramayo maintains is an admission of indebtedness on the part of the State and a refutation of the charge of vast indebtedness by the companies for unpaid taxes and undelivered foreign exchange. More than this could hardly be expected at a time when, as Sr. Aramayo observes, the Government is not in a position to make payments of any magnitude.

The Aramayo Mines as the result of large investments in mines and plants of recent times had considerably increased its output of tin from a monthly average rate of 177 tonnes in 1949 to 261 tonnes last year, and similarly with its other mineral products. From January 1 to October 31 last year the company's output was 5,258 tonnes of concentrates containing 2,612 tonnes of metal, a grade of just under 50 per cent. Other produce was 2,666,100 f.oz. of silver, 4,290,771 kilos of lead, 6,125,744 kilos of zinc, 32,988 s.ton units of WO_3 and 27,639 kilos of busmuth. We have no data regarding current production of concentrates since the Government took over the management of the mines, but Bolivian exports of tin have increased over those of recent years and may well be due to the extensive development programme mentioned by Sr. Aramayo and probably undertaken also by the two other nationalized producers. It is naturally impossible to judge how far an active and advancing scale of development will continue to be carried out under the new regime, or whether under the stress of economic stringency the mines are likely to be worked above their grade. In the case of the Aramayo staff, despite the offer of higher salaries, nearly all the technical staff refused to accept the new position and left the company, and probably the same may be true of the Patiño and Hochschild employees.

As regards the disposal of concentrates, the Aramayo Company sold its stock of concentrates in Chilean ports to the R.F.C. at 117½ c. per lb. before the collapse of the tin market. Early last January the R.F.C. made a spot pur-

chase from the Corporación of tin concentrates from the Hochschild and Aramayo properties and negotiated a contract with Williams Harvey for the smelting of the Patiño concentrates. The Aramayo Company also held a wolfram contract with the G.S.A. to sell their wolfram at a scale of from $55.5 to $61.61 per s.ton unit of which there was still more than two years to run. This contract the company transferred to the Corporación despite objections by the G.S.A. Under the agreement thus negotiated with the Corporación, the Aramayo Company is entitled to certain percentages, not only the value of the tungsten, but of all tin, silver, lead, zinc and other concentrates of their mines which are sold by the Bolivian monopoly, though at present prices the value of the percentages is negligible. Valuation of the mines' produce and plants confiscated remains in the air and may well exceed the resources of the Government ever to discharge.

Such then in brief outline is the outcome of one of the most drastic mine nationalization proceedings of recent years. Had the shares of the companies nationalized been extensively held in this country or the United States, they would probably have attracted a much greater public notice, but if as is suggested from time to time by Bolivian Government spokesmen, the Administration is ever anxious in the future to attract the investment of foreign capital it will certainly have a big initial task to satisfy foreign corporations that Bolivia offers a safe field for the investment of their funds.

The Strike Wave

The strikes in British Guiana and the efforts made to foment further trouble there serve to high-light the widespread strike movements now being experienced in so many parts of the world and naturally raise the question of how far these have a common origin, usually attributed to Soviet manipulated infiltration. In Chile a protracted strike of the Lautaro nitrate workers has just terminated, but that of the copper miners in the Anaconda properties at Chuquicamata and Potrerillos appears to have spread despite all the efforts of the administration and some 10,000-12,000 men are believed to be idle. In the United States it has been necessary to apply injunction proceedings under the Taft-Hartley Act to postpone and to limit the longshoremen's strike. But the revision of this Act in the next session of Congress may result in strike movements in many directions, and already the C.I.O. has announced that it would not have agreed to the nineteen proposed amendments which President Eisenhower had signed and was about to submit to Congress when Senator Taft's death intervened. There is no news as yet of the outcome of the C.I.O. United Auto Workers Union and the brass company's dispute, and the big C.I.O. unions are now generally demanding the guaranteed wage. Lightning or wild-cat strikes are, of course, incidentals.

In Canada labour seems widely dissatisfied and there are current strikes among the gold miners of Ontario and Quebec a settlement of which is not in sight. In the north of British Columbia 5,000 timber men are on strike while further south 3,000 more, together with 4,000 pulp and paper mill workers and 1,000 electrical workers, have applied for Government supervised strike votes, and 15,000 pulp and paper employees are to vote at the week-end on a six-month wage and contract dispute. Quite recently, 5,000 Newfoundland fishermen had been idle for about a month. In Saudi Arabia, which in the first nine months of the year has produced 230,882,140 bbl. of crude, some 13,000 out of 15,000 workers are reported to have struck. Nor is the situation at home free from anxiety with big demonstrations by the miners in South Wales in support of claims for increased pay and the aggressive attitude of the engineering unions and of the Smithfield workers and petrol tank drivers.

This list could, no doubt, be increased but is formidable enough as evidence of widespread labour unrest.

In most cases, the increased cost of living and the consequent need for higher pay is the basic ground put forward to explain the general *malaise* but obviously nothing could be more calculated to accentuate increased living costs than the continuation or stimulation of the strike psychology so generally prevalent to-day.

Mr. Havenga on the Need for Higher Gold Price

In announcing the end of import control discrimination in favour of the sterling area, and allowing dollar goods competitive facilities in the Union market, the Minister of Finance, Mr. Havenga, is reported as saying that this was possible because of the improved competitive position of British and Continental exporters. However, the Union would renew the guarantee to allow Britain to earn a minimum of £50,000,000 worth of South African gold but unless the necessity for an adjustment of the price of gold was realized soon other measures to restore mutililateral trade could not achieve full results. The objects of the International Monetary Fund and G.A.A.T. could not be achieved and maintained without a rise in the gold price; without it these two institutions were doomed to frustration and ultimate collapse. We could only hope that the United States would be able to make the necessary adjustments to its policies and enable South Africa to continue with the policy of non-discrimination which they proposed to follow.

Brazil

(From Our Own Correspondent)

Teresopolis, October 12.

An order was issued by the Controller of Currency and Credit at the beginning of the month permitting certain minerals to be sold abroad with 50 per cent of the export bills negotiable on the free market. However, as from October 12 the Finance Minister has introduced an entirely new regime for foreign trade with a view to liquidating Brazil's outstanding commercial debts, increasing exports, and restricting imports within the limits of exchange availability. Henceforth, all export bills must be sold either directly or through the intermediary of authorized banks, to the Bank of Brazil. Exporters will receive the proceeds at the official rate of exchange plus a premium of 10 cruzeiros per dollar, or its equivalent. All exports of minerals and other products are placed on an equal footing.

Brazil's foreign trade policy is now undergoing successive abrupt changes in the effort to find a way out of the country's difficulties. Spectacular post-war industrial development has thrown a heavy strain on her finances. To maintain her industries at their present level of development she needs to import an immense volume of raw materials and industrial equipment each year. To this end she persists in maintaining a fictitious rate for the cruzeiro which has dropped 83 per cent in purchasing power in recent years. Production costs have increased, raising the price of exports and causing the loss of foreign markets. Before Brazil can earn enough to pay for large-scale imports she must increase production and reduce costs—a slow process. The situation is complicated by the fact that the population is growing at the rate of 1,000,000 yearly and that wages are rising rapidly.

Brazil's receipts in foreign currencies have hitherto been derived mainly from coffee, cotton and cocoa. During the last two years conditions on world markets have reduced the demand for her cotton and cocoa, while increased local consumption, due to growing population and higher wages, have obliged the Government to curtail cereal exports.

Finally, Brazil's high prices, caused by inflation and a fictitious cruzeiro value, have seriously affected the demand from abroad for vegetable oils, fibres and the majority of minerals. Since July all these so-called "problem products" have gradually been admitted to the benefits of the Free Exchange Law.

EXPORTS DURING 1952

Exports of mica decreased by 90 tonnes last year, wolframite by 793 and unspecified metallic minerals by 9,335. Although Brazil is the world's most important source of quartz for electrical purposes, the demand has not increased in recent years and exports of mica continue to decline, despite its excellent quality. Shipments of Brazilian rutile (with 95 per cent titanium oxide) and ilmenite, which reached 6,750 tonnes in 1944, are now insignificant. So, also, are exports of tungsten, which totalled 2,038 tonnes in 1945.

On the other hand the demand for iron and manganese ores is well maintained. Contracts were signed last year to ship 1,200,000 tons of haematite to U.S.A. in 1953, but the price then dropped from $18 to $16.27, and later to $13.50, per ton, although Poland, Austria, Germany and France continued to pay $18.20 until April. No shipping licences were issued in May, June or July, but Austria took 16,258 tons, at $17.38, in August, and Czechoslovakia has offered $18, but under a species of barter deal, which Brazil hesitates to accept.

The average price of manganese, which was U.S. $28.16 per ton in 1952, rose to 31.40 during the first five months of 1953. In June and July licences were granted to ship 15,519 tons to U.S.A., at $31.35, and 4,064 to Germany at $27.68.

In order to boost exports, sales of minerals are now scheduled in the following trade agreements, the annual values being quoted in U.S. dollars: To Germany, iron ore, 6,500,000; manganese, 800,000; mica, 300,000; magnesite, 150,000; rock crystals, 50,000. To Finland, mica, 10,000. To Argentina, quartz, 15,000; graphite, 15,000; bauxite, 1,210. To Austria, iron ore, 2,000,000; manganese and wolframite, 1,200,000. To France, unspecified minerals, 1,000,000. To Italy, quartz, 250,000; mica, 10,000; iron ore, 1,000,000; non-ferrous minerals, 800,000. To Japan, iron ore, 150,000; rock crystals, 100,000. To Poland, iron ore, 1,800,000. To Czechoslovakia, iron ore, 300,000.

Western United States

(From Our Own Correspondent)

Portland, Oregon, October 16.

Senator James Murray, of Montana, in the last days of the recent session of Congress, introduced a Bill to provide an agency, presumably of cabinet rank, for handling all affairs pertaining to mineral production. Heretofore, such matters have been in the Department of the Interior, principally in the hands of the Bureau of Mines and the Geological Survey, or with certain independent boards created for the duration of the emergency, but the industry has felt for many years that mining is of sufficient importance to entitle it to its own department, such as agriculture has had for more than a half-century. The Bill will not come up for consideration until Congress reconvenes in 1954.

The Senate has instructed the Tariff Commission to make a thorough survey of the lead and zinc situation and submit reports before March 31, 1954.

United States Attorney, General Brownell, has filed suit against American Smelting and Refining Co. and St. Joseph Lead Co. alleging conspiracy to control the lead market of the country. Although these two are among the largest producers, perhaps *the* largest producers, it seems rather a long stretch of imagination to suppose that they can maintain a monopoly against such organizations as U.S. Smelting, Bunker Hill and Sullivan, or Anaconda.

OPTIMISM AMONG LEAD PRODUCERS

Current news indicates that while the lead and zinc situation is rather gloomy at present, operators, in lead at least, have confidence in the future and are preparing to meet it. Shenandoah-Dives, in Colorado's San Juan district, which closed down March 15 *(Mining Journal,* May 22) is making plans to resume operation after extensive development. Principal feature will be a 3,000 ft. deep level tunnel with related development. The project involves an expenditure in excess of $400,000, half of which will be provided by a government loan.

Bunker Hill and Sullivan in the Coeur d'Alene district has completed what is practically a new lead smelter as part of a $3,000,000 improvement programme. A feature of the plant will be a unit for blending concentrates and flux and pelletizing the mixture prior to sintering.

While such items as the above indicate optimism among the lead producers the news from the zinc operators is not so encouraging. U.S. Smelting's Bayard, last sizeable zinc operation in New Mexico, has finally succumbed. In hopes of avoiding a shutdown employees voluntarily agreed to a cut in wages until the zinc situation improved *(Mining Journal,* June 12) but even this action failed to provide the necessary relief.

American Zinc, Lead and Smelting Co. has announced reduction of the monthly output of its Fairmont, Illinois, smelter by 1,800 tons, equal to one-fourth of capacity. At its Grandview mine in the Metalline district in Washington output has been cut one-third and Pend Orielle has gone on a five-day instead of a six-day week.

Bradley Mining Co. has opened the Livingstone tungsten mine in the general vicinity of its Yellow Pine at Stibnite, Idaho. The ore occurs as scheelite in a talus deposit and is scooped up, crushed and jigged. A similar deposit in this same locality was an important producer during World War II. Salt Lake Tungsten Co., owned by Minerals Engineering Co. and Sylvania Electric Co., has completed its tungsten refining plant at Salt Lake City. Attention will be given first to the treatment of an accumulation of rejects from the old tungsten plant on the same site.

Dodge Construction Co. has made a contract for 60,000 tons of iron ore from its Nevada mine to be shipped to Japan.

INCREASE IN URANIUM OUTPUT

Since introduction in March, 1951, of the policy of paying a bonus under certain conditions, principally grade of ore, for uranium ores, Atomic Energy Commission has paid in excess of $2,100,000 to producers in such premiums. Current payments are averaging approximately $180,000 per month.

The first half of 1953 showed continued increase in uranium output and included for the first time production as a by-product of the treatment of phosphate rock. It is estimated that during 1952 there were 450 uranium mines and prospects operating in the Colorado Plateau area. An important extension of the field into the Bull Canyon district of Montrose County, Colorado, has been proven.

Titanium Metal Corporation, owned jointly by National Lead and Allegheny-Ludlum Steel Co., has its titanium plant at Henderson, Nevada, completed and in operation. Production is planned for 3,600 tons of titanium metal p.a.

Wollaston and the Platinum Metals

In April, 1803, there appeared an anonymous handbill announcing that samples of a new noble metal could be bought from Mr. Forster at 26 Gerrard Street, Soho. In this curious fashion did William Hyde Wollaston announce his discovery of palladium. The "triple jubilee" of this disclosure gave the Institution of Metallurgists an opportunity of calling public attention to the remarkable work of a great British scientist. The commemoration has taken the form of an exhibition at Grosvenor House, London, which was opened by the Duke of Edinburgh on October 19. It features Wollaston's achievements and also demonstrates how indispensable the rare platinum metals have become. Although platinum and palladium are widely used in jewellery manufacture, more than 75 per cent of the total production of platinum metals is used for industrial applications.

Palladium was the second metal of the group to be discovered, platinum itself having been known since the 16th century. Rhodium was also identified by Wollaston and osmium and iridium by his contemporary, Tennant. Finally, ruthenium was discovered in 1840 by Claus, a Russian chemist.

Only two industrial applications of palladium and rhodium by their discoverer himself are known. Wollaston supplied palladium as a gold alloy to make bright and untarnishable graduations for scientific instruments, one being the notable mural circle erected by Troughton at the Royal Observatory, Greenwich, in 1812. In the 1820's he used an alloy of tin and rhodium for durable pen points.

PREPARATION OF MALLEABLE PLATINUM

In financial association with Smithson Tennant, F.R.S., Wollaston succeeded in preparing malleable platinum more satisfactorily than by current methods, and in industrial quantities. The first known platinum boiler in the world was made in 1805 with Wollaston's and Tennant's metal and under their supervision. The chemical industry was then entering upon a period of rapid expansion and platinum boilers were soon in growing demand for use in the production of sulphuric acid. A large proportion of the Wollaston metal was sold to makers of sporting guns for touch holes (replacing gold) and probably for ornamentation. About 1821 Wollaston ceased manufacturing malleable platinum directly, though possibly the process continued to be worked under his licence. Its details were made known when he lay dying, by the famous paper, "On a method of rendering Platinum malleable," which he had prepared with other papers on his sick-bed.

A section of the exhibition is occupied by an interesting collection of items connected with Wollaston and his discoveries and with the early history of the platinum metals. Among them is a copy of the famous handbill, in which palladium is offered for sale "in samples of Five Shillings, Half a Guinea and One Guinea each," a design for a palladium cup presented to Charles X of France in 1824, and an inventory in Faraday's hand of the platinum and palladium given to the Royal Society by Wollaston.

Among the most remarkable exhibits is a set of counterfeit "gold" coins made of gilded platinum. The Bank of France issued a warning in 1878 concerning these coins and described in detail the appearance of specimens that had come into its hands. To-day the price of platinum is 2½ times that of gold!

The production and refining of the platinum metals was first undertaken early in the 19th century by Johnson and was further developed in later years by his junior partner, George Matthey. For many years before the First World War the firm of Johnson, Matthey and Co. played a leading part in the refining and marketing of the Russian output of platinum, which up to that time represented some 85 per cent of world production. When supplies from this source dimininshed the company became associated with the development of platinum mining in the Republic of Colombia.

Wollaston's total production of malleable platinum was some 36,000 oz. from 47,000 oz. of concentrates. Last year the world's largest producer, Canada, had an output of 317,436 oz., the entire Canadian production being derived by recovering small quantities of platinum metals present in the copper-nickel ore of Sudbury, Ontario. The most notable development since the war has been the advent of South Africa as a major producer. The chairman of Rustenburg Mines told shareholders last year that it was planned not only to open fresh mines, but also to double the output, which might mean a figure of some 300,000 oz. annually. On the other hand, the U.S.S.R. output is declining and according to Professor Shimkin ("Minerals—a Key to Soviet Power") is less than half the present Canadian production.

On behalf of the Queen, the Duke of Edinburgh accepted from the Institution of Metallurgists a powder box made entirely from metals of the platinum group, with platinum and palladium predominating; rhodium, iridium, ruthenium and osmium being used in their normal roles as hardeners of the two major platinum metals.

Because of its complete freedom from oxidation up to very high temperatures, its remarkable resistance to chemical attack, and its high melting point, platinum has many important applications in chemistry and engineering. For some purposes electrical contacts must be completely reliable under all atmospheric conditions and for many millions of operations. Among the exhibits at Grosvenor House was a platinum contact which has completed 380,000,000 operations and is still serviceable. Rhodium plated silver contacts are components of fire detector switches for use in potential fire zones, while iridium-platinum alloy contacts are used in echo depth sounders. During the last war a tungsten-platinum alloy was developed for aircraft spark plugs to withstand very severe conditions of spark erosion, high temperature, vibration and attack by lead resulting from the decomposition of anti-knock compounds.

WIDE USE AS CATALYSTS

The platinum metals are widely used as catalysts. Two of the most important applications for platinum catalysts are in the manufacture of nitric acid and nitrates, and in synthesizing high octane petrol from natural petroleum. Palladium catalysts are used in the production of fine chemicals, such as the anti-biotic dihydro-streptomycin, and also in gas purification. A unique property of palladium demonstrated at the exhibition is that this metal will act as a filter for hydrogen. Filters made of palladium are used to separate hydrogen from mixtures of gases.

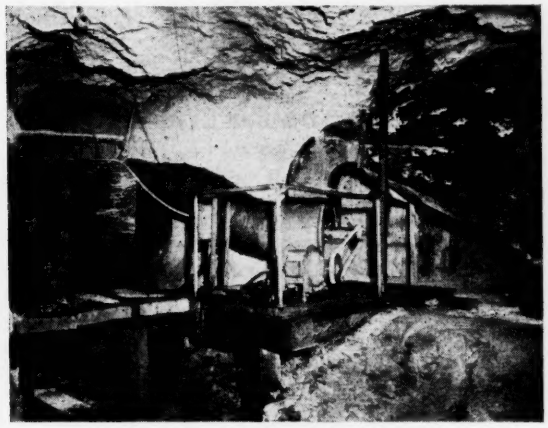
Because of its high melting point platinum is extensively used to make crucibles for pouring molten liquids such as glass, while its outstanding resistance to corrosion renders it suitable for the production of chemical plant, where extremely corrosive materials are to be handled or where the purity of the product is of great importance.

In instrument practice, probably the most widely known application of platinum and platinum alloys is the platinum-rhodium-platinum thermo-couple for high temperature measurement.

Western Australia's Golden Mile

On the Kalgoorlie goldfield of Western Australia the general position has improved greatly during the past two years, and further improvement is expected. The following article describes the lode formations of the Golden Mile, and briefly indicates the profitability of the operations being carried on by certain companies of the area.

The lodes of Western Australia's Golden Mile generally consist of nearly vertical zones of rock which are more or less continuous with the country rock surrounding them. In some cases quartz reefs of small size have been worked, but shearing action of some intensity has crushed and foliated portions of the main rock masses in certain defined directions to produce well revealed bands of lode formations in which gold values occur.



A modern dust settlement and filtering unit for treatment of air drawn from conveyor loading and discharge points

Nine companies are currently producing from the lodes at levels approaching 4,000 ft. depth in order to follow the vertical line of lode. The lodes vary from 5 ft. to 30 ft. in width and run longitudinally for hundreds of feet, carrying uniform and moderate gold values. There are, however, a number of zones of special richness peculiar to some mines as shoots.

The superior payability of the lode formations, and particularly of the richer shoots, is largely due to the presence of various tellurides of gold and silver. Tellurides were first reported in 1896, when telluride of gold ore was discovered at Block 45. From its first crushings Great Boulder yielded 40,000 oz. from 8,000 tons of ore, Lake View 15,000 oz. from 5,400 tons, Ivanhoe 6,800 oz. from 3,500 tons, Brown Hill 2,400 oz. from 750 tons, and Boulder Perseverance 7,000 oz. from 2,100 tons. In the first four years of the fields operations, 112,000 tons of ore yielded 337,000 oz. of gold.

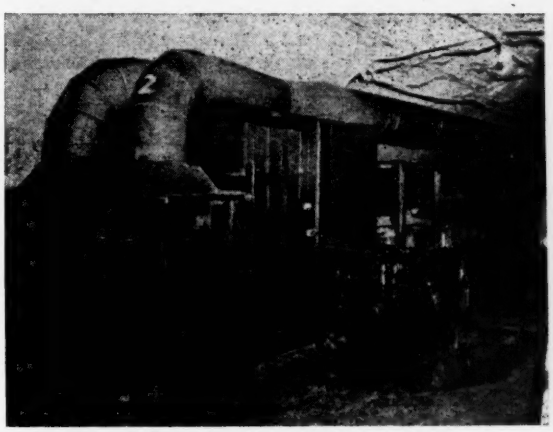
Great Boulder Proprietary Gold Mines Ltd. has continued as a successful mining company since 1893, and its first year of production yielded 26,663 oz. of gold from 4,291 tons of ore, an average of more than 6 oz. to the ton.

The three principal leases of the Great Boulder holdings occur in quartz dolerite greenstone, the most productive rock in the Kalgoorlie field. The leases are traversed by a composite belt of slate and porphry known as the Boulder Dyke which is actually a band of slate intruded by albite porphyry. The average width of the dyke is 200 ft. It strikes northwest and dips southwest at a steep angle, where it gives an increasing area of quartz dolerite greenstone, but with the exception of a northern extension and two western branches of the main lode, the dyke has not yet been proved to contain payable ore bodies.

Development of payable ore is by 8 ft. x 6 ft. drives on lode off 8 ft. x 7 ft. crosscuts. Level intervals are 150 ft. vertically but in the older workings some 100 ft. and 120 ft. intervals were developed. The annual output totals 450,000 s.tons and ore reserves of Great Boulder lodes are estimated at 2,121,200 s.tons averaging 5.2 dwt. per ton.

Lake View and Star Ltd. holds 47 leases in the heart of the Golden Mile and about 132 miles of lateral development has been completed in exploration and development of 150 known lodes. Since 1910, when the company was incorporated, 28,122,050 s.tons of ore have yielded 12,159,450 oz. of fine gold. Productive lodes of Lake View and Star occur in dolerite greenstone but other profitable ore shoots have been found in calc schist (older greenstone) and porphyry, and in some locations entirely in beds of slate which are associated with the porphyry. At present 90 levels serviced by six main shafts are being worked. Ore reserves are estimated at 3,723,700 s.tons averaging 4.72 dwt. per ton.

North Kalgurli (1912) Ltd. holds 20 leases to the north and east of the Golden Mile but an amalgamation in 1928 consolidated its holdings, which although existing and producing since 1895, had been under different ownerships. Since 1928 North Kalgurli has produced 3,183,547 tons of ore which yielded 1,062,662 oz of fine gold, averaging 6.67 dwt. per ton. Ore bodies exist in calc schist or fine grained older greenstones and quartz dolerite greenstones, while in the southern sections ore bodies show wide variation in character. Here some consist of wide silicious lode material or of narrow telluride seams. Payable ore reserves are estimated to total 2,234,000 l.tons with an average of 5.6 dwt. Rock temperature gradient on the



The discharge end of conveyor belt on No. 7 level, at North Kalgurli

Golden Mile is at 1 deg. F. rise for each 225 ft. depth, and at 4,000 ft. levels rock temperature averages 90 deg. Downcast and natural draft ventilation, however, enables temperatures from 70 to 78 deg. to be maintained.

An indication of the wealth of the Golden Mile is revealed by the fact that the field produces annually in the region of 500,000 f.oz., and at current prices gold to the value of £A450,000,000 has been produced since operations began in 1893.

Rock Bolting Practices in Canadian Metal Mines

The recent proceedings of the Mine Accident Prevention Association of Ontario included a symposium on rock bolting practices in Canadian metal mines, which attracted papers from officials of several important mining companies, namely Aunor Gold Mines Ltd., Macassa Mines Ltd., Hallnor Mines Ltd., Lake Shore Mines, Quemont Mining Corporation Ltd., and Hollinger Consolidated Mines Ltd. The papers appeared in *Canadian Mining Journal* No. 9 Vol. 74, and the following article is a condensation of their remarks and conclusions. Although experimentation with rock bolting has been carried on as an individual effort by the companies concerned, the conclusions reached show a marked similarity. It is, however, doubtful whether bolting is sufficiently reliable to eliminate the need for some timber support.

Among the advantages of rock bolting are the general cheapness of bolting in comparison with traditional timber support methods, and the fact that in the majority of situations ventilation flow is less impeded while simultaneously a greater scope is given to normal mining operations. In his summary of the papers presented at the symposium, Mr. E. Thomas, chief of the roof control section, U.S. Bureau of Mines, considered that the main advantage of bolting was to consolidate beams. It was further indicated in the majority of the papers presented that rock bolting equipment would be easily and cheaply provided from mine shops, and that considerations of safety and, indeed, of overall effectiveness, demanded that rock bolts should be installed at the earliest possible moment after blasting.

AUNOR G.M. DEEP LEVEL OPERATIONS

Rock bolting at Aunor Gold Mines Ltd. was discussed in a paper by Mr. S. Thib, mine captain, who pointed out that as early as 1940 rock bolts were used as a means of ground support on that property. The backs of shaft stations were bolted at irregular intervals as well as the walls of drifts where slabbing might occur, and bolts were made from 1 in. round iron with one end split to receive a wedge and the other end threaded to secure the outside plate and nut. In areas where excessive slabbing or loose might occur, long sections of 90 lb. rail were used, held in position by three or four bolts. This practice proved entirely satisfactory. Deeper mining operations, however, encountered worsening ground conditions, and the use of rock bolts was revived until at the present time rock bolts at Aunor are used in stoping and other operations. Bad ground at Aunor demands back and wall support immediately after blasting and it is believed that this problem has been solved by the use of rock bolts.

The rock bolts used are of the type originally employed on the property, anchored by a flat angle wedge, and 6 ft. 6 in. long. Eight inches are threaded at one end with standard coarse thread, while at the opposite end a 6 in. slot $\frac{1}{8}$ in. wide is burnt. The threaded portion takes a 1 in. standard hexagonal nut. Additional features are that the $\frac{1}{4}$ in. mild steel holding plate is cut 12 in. by 5 in. long, tapered from $\frac{1}{4}$ in. to a fine point. These bolts are made in the mine shops at a cost of $2.61, not including overhead.

In placing a rock bolt a hole is drilled 6 ft. into the back or wall by means of a rock drill using standard bits. A standard dolly adaption is used to drive the bolt into the hole. The dolly is threaded over the protruding end of the bolt, a short piece of drill steel is placed into the other end of the dolly, and the rock drill is used to anchor the bolt in the rock. The operation takes approximately 2 min., and the plate is then put on and the nut tightened.

Rock bolts are placed in the back or wall at a minimum of 5 ft. centres immediately after blasting and scaling. Experience at Aunor has shown that effectiveness of rock bolting is increased by rock bolting ground immediately after blasting. The rock bolts are placed in no regular pattern, and the practice has replaced the use of timber in drifts, although Aunor engineers consider that the limitations of rock bolting must always be considered.

The assistant manager of Macassa Mines Ltd., Kirkland Lake, Mr. J. D. Bryce, said that rock bolts on that property would simply be used until a more advantageous method of support was discovered. The main reason for using rock bolts at Macassa was to cut dilution from the hanging wall in shrinkage stopes. Indeed, by the use of rock bolts it had been possible to shrink some stopes which previously had been mined by cut and fill.

IMPORTANCE OF LOCAL GROUND CONDITIONS

Local ground conditions are the overriding factor which determines the effectiveness of rock bolting, and the speaker stressed that the practice had not been completely successful at Macassa. This was largely because conditions had shown too marked a deterioration before bolting was commenced, although while these conditions did not allow the bolts to control the ground treated, they were nevertheless improved.

Rock bolting as wall support in stoping operations was commenced at Macassa some two years ago. A split pin type bolt is used, made of 1 in. or $1\frac{1}{4}$ in. diameter rod with a 6 ft. length regarded as a future minimum. This length, however, is subject to alteration under the dictates of localized conditions. The nut end is threaded for 6 in., and a wedge 6 in. long tapering in the last $1\frac{1}{2}$ in. is used. The cost of a 6 ft. bolt of this type is approximately $3.

Hammer drills with anvil blocks are used to drive in the bolt, although the bolt holes themselves are drilled with jacklegs and the bolt, fitted with anvil block, is driven with sledge hammers. The most common method of bolting at Macassa has been the use of rock bolts with channel iron, and it has been found most effective to drill and place the holes before blasting the breast. It has been proved on this property, moreover, that rock bolting cannot be used in narrow, flat-dipping stopes, as under these conditions the bolts cannot be driven to the planes of weakness. The speaker considered that rock bolting would not completely erase the use of timber support, but that under certain conditions it would give more effective support for less cost.

SUPPORT IN ALL ZONES AT HALLNOR

Mr. J. A. Hall, mine superintendent of Hallnor Mines Ltd., pointed out that the ground on this property required support in all zones where mining was in progress. Prior to the adoption of rock bolts, conventional timbering methods were used to support the walls and back, but during the last three years the use of rock bolting had increased annually. Rock bolting was more pronounced in stopes and drifts, where it was used to support the slate walls.

The principal equipment used to-day at Hallnor is the split wedge type of rock bolt, the slip wedge type, Holman airleg, tappet type, long and short leg C.J.R. 58 stopers, Liddicoat type L steel bits and dollys to fit the chuck of the airleg and the stoper. Both types of bolt are made in the mine shops in sizes of 1 in. and $1\frac{1}{4}$ in. diameter of and from 6 ft. to 9 ft. in length.

In the method of installation, holes are drilled with either the airleg or the stoper, and the track tie, bearing plate, timber washer and hexagonal nut are positioned with the

rock bolt in the hole. The wedge type bolt is driven by use of the dolly inserted in the chuck of either machine, but the slip wedge type is inserted by hand and tightened to the desired distance. It has been observed that the best success with rock bolting has been obtained when bolts were placed immediately after the ground was broken.

The slip wedge type of bolt was first developed two years ago, and has proved effective for the support of stope walls. The rock bolt itself is easily recoverable, is easier to position, while at the same time the length and diameter of the hole need not be absolutely according to specifications. Changes are to be made in the design of the wedge, and it is hoped that thereafter the slip wedge type will prove suitable for all requirements. In all, among the many benefits arising from the use of rock bolting at Hallnor Mines, it had been determined that the practice provides for increased safety and lower costs.

Mr. M. Seymour, assistant mine superintendent, Lake Shore Mines, said that on this property rock bolts are used for two general purposes. First, to stop backs and walls of drifts and crosscuts from sloughing and strain bursting, and second to bolt drifts and crosscuts that were under pressure and those expected to come under pressure owing to the advance of mining operations. It is expected that the use of bolts in stoping practice will increase as experience is gained of their value in ground under pressure.

Two types of bolts are used at Lake Shore, the first a simple split pin and wedge made from 1½ in. stock for anchoring duties; and the other the "Foran" type, made from 1 in. diameter and fitted with a short length of 1½ in. diameter rubber hose. This bolt is inserted in a hole drilled to a diameter of 1⅝ in., and the rubber sleeve expanded against the wall of the hole by the method of turning a nut against a steel sleeve. The 1⅝ in. holes are drilled with a 3 in. drifter mounted on a single jumbo.

Bolts used are of varying lengths, chosen according to the prevailing conditions. A shorter bolt is generally effective in sloughing ground, but a longer unit is placed if the ground shows a tendency to burst. Experiments were conducted in haulage-ways and drifts and as support over switches. It was found that experience to date lends considerable confidence in the types of bolting use, and for the support of faces in drifts and crosscuts under pressure.

SLOTTED ROD AND WEDGE BOLTS

Rock bolting practice at Quemont Mining Corporation Ltd. was described by Mr. W. D. Jamieson, mine superintendent, who said that rock bolting began on the property in late 1950 and that experimentation since completed has indicated the selection of the slotted rod and wedge type of bolt as the most suitable for the particular mining conditions prevailing. All bolts are fabricated in the property shops, and rods are cut from 1 in. diameter round mild steel to a length of 7 ft. 6 in. Threading is done on a small "handiss" threader, and nuts are standard 1 in. hexagon.

Holes are drilled and bolts driven with stopers or jackslegs, the driving dolly consisting of a 12 in. drill steel with a half length of sectional steel coupling, bronze welded to one end. The inside of this coupling is bronze lined to a cup shape which fits over the end of the threaded bolt end. Hollow socket T-type wrenches with 18 in. handles serve to tighten the nuts.

At Quemont, the judicious use of rock bolts has become a preferred method of temporary ground support in routine stoping operations, and to a lesser degree as permanent support in mine service openings. Two methods of stoping are employed, namely horizontal cut and fill, and sub level benching.

Since rock bolting was accepted as a method of ground support, stope widths have been reduced so that backs can be made secure with a minimum of bolts. The cost of additional services for stoping widths of 20 ft. and less is more than offset by increased efficiency gained by having the entire stope area clear for mining operations. Pattern bolting is not practised.

The features of rock bolting most desirable in relation to the cut and fill operations of Quemont are: (1) Stope perimeters above the broken ore line can be immediately secured as exposed; (2) only enough ore to permit drill rigging need be scraped during the breaking period; (3) there is a maximum clearance for ore and fill scraping operations; (4) the minimum timber is employed, reducing fire hazard and cost; (5) there is the minimum of timber handling and storage.

The most common application of rock bolting at Quemont is in back stopes, while mining operations are carried on beneath the bolting line. This application has been carried further in recovery by the benching of suitably sloped ore sections. The important factors in the obtaining of effective bolting include the limiting of excavations to widths that can be satisfactorily bolted, and the placing of bolts as early as possible.

PROGRESSIVE DEVELOPMENT AT HOLLINGER

Mr. B. Awde, analytical engineer, Hollinger Consolidated Mines Ltd., said that the problem of loose ground and its attendant detriments prompted the decision in 1950 of the Hollinger Company to investigate rock bolts. The use of these equipments has followed a pattern of progressive development, until currently the breadth of use has developed in three main steps, i.e. use in narrow stopes 4 ft. to 8 ft. width; use in wider stopes 8 ft. to 16 ft. in width with post support added, under supported timbers, immediately after the completion of the filling operation; and in wider stopes, 8 ft. to 16 ft. in width without added posts.

The pattern of bolt placement has developed with the progressive steps in their range of usage. In narrow stopes, rock bolts are set in a row of holes drilled at approximately 4 ft. 6in. intervals along the centre line of the stope back. Six or 7 in. of bolt is left protruding and upon this is placed a 4 in. by 10 in. by ¼ in. mild steel plate, with its long dimension crosswise to the line of stope. Two 7 ft. 6 in. by 4 in. flat lagging are placed one on either side of a successive pair of bolts, upon the plates and tightened against the back by running up the nut under the plate.

In wider stopes a 2½ in. by 2½ in. by 17 in. angle iron with a slotted hole in each end of one flange is in general use. A pair of rock bolts so joined makes up the generally used "4 bolt set," which is usually placed crosswise to the stope length at from 5 ft. to 7 ft. intervals, depending on the ground conditions of the stope. The evidence appeared to indicate that it would be reasonably safe to omit the use of post support in a number of stopes which are now being handled in this manner. No particular pattern has been developed for use in wall bolting.

The procedure following in the setting of rock bolts is possibly the most important factor determining the degree of success attending their use, and their value as a medium of accident prevention must not be lessened by their installation becoming a further source of accident.

At Hollinger, holes for setting rock bolts are drilled with a 1⅝ in. four-wing tungsten carbide insert bit in most stopes. Tightening of the bolt to set the plug within the shell to obtain a firm setting, is accomplished by using a blind nut and the T-handled socket wrench. Bolts of 5 ft. and 7 ft. lengths are presently in use, although previously an 8 ft. length was used. A comparison of costs shows that a rock bolt set of four rock bolts with 8 in. flat posts costs $19, while the standard timber safety set costs $24.50.

MACHINERY AND EQUIPMENT

Engineering Industries Association Exhibition

The main purpose of the sixth annual display of the London Region of the Engineering Industries Association, was to allow smaller engineering firms to display to larger manufacturers. It was hoped that the outcome of this contact would be that either direct orders from Britain or overseas, or sub-contract work from larger British operatives, would accrue to displaying members of the E.I.A. The display, which was opened by Sir James Helmore, K.C.M.G., Permanent Secretary, Ministry of Supply, was held in the Royal Horticultural Society's New Hall, Greycoat Street, London, from Tuesday to Thursday last week, and it would seem that the main purpose was achieved as approximately 1,000 visitors attended the display on the first day. The wide general appeal of this year's exhibition was shown by the fact that before the doors shut on Tuesday evening visitors had attended from India, New Zealand, Canada, the United States, Israel, Australia, Pakistan, South Africa, and France.

The exhibition itself was small in comparison to the displays traditionally associated with Olympia or Earl's Court, yet it was none the less impressive. Within its 20,000 sq. ft. of floor space 148 members set their stands, and 32,000 tickets were applied for and distributed. A feature of this annual exhibition is that, because of the rather smaller stature of the majority of displaying companies, it is usual for visitors to meet the executives of a firm on a stand. Visitors are thus able to discuss their requirements at the highest level on the spot.

Among exhibitors whose products were of interest to the mining engineer, *The East Sussex Engineering Co. Ltd.* on Stand 136, showed soft grey and high duty iron castings, together with compressor, pump and water meter bodies able to withstand a high lb. per sq. in. pressure. The exhibit included also all grades of non-ferrous sand castings in aluminium, aluminium bronze, brass and gunmetal to Admiralty specifications. Metals stockholders were represented by *Leo Rapp Ltd.* who displayed aluminium, aluminium alloy, brass, copper and other metals in sheet, rod, strip, section and tubes on Stand 87.

The *Dominion Engineering Co. Ltd.* exhibited an industrial process machine on Stand 28. Also included in this display were examples of high precision machined components and sub-assemblies. One of the larger industrial concerns exhibiting, *The Mond Nickel Co. Ltd.*, offered technical publications as a service to engineers on Stand 143. The publications provided information on the choice, production and use of high quality materials developed through a comprehensive research policy.

It was refreshing to see the accent on industrial safety enterprise struck by the display of *Safety Products Ltd.* on Stand 96. Here a complete range of industrial protective equipment was shown comprising goggles, face shields, welding glasses, B.S. 679, industrial spectacles, gloves in rubber, leather and asbestos, and respirators of various types. A belt for the support of men working on inclined faces in mines and quarries was of particular interest to mining engineers.

Display space at the exhibition was open to member firms of the E.J.A. only, and a unique feature was that a section was devoted to blueprints and samples of work which main contractors wished to put out on sub-contract. Inspection of the drawings was open only to members of the Association.

Small Mines Diesel Locomotive

Hole-in-the-Wall, a naked-flame mine near Crook, in Durham Division No. 5 Area of the N.C.B., has recently put into service four Hudson-Hunslet 21 h.p. diesel locomotives of the new quality construction range, and equipped with full exhaust-conditioning but without flameproofing.

These locomotives are of 2 ft. gauge and weigh 3½ tons, and have a two-step Hunslet mechanical transmission giving track speeds of 3½ and 7 m.p.h. Top tractive effort in bottom gear step is 1,910 lb. All four locomotives have cabs, but the fourth has a special cab cut down level with the top of the casing and the sides of the sandboxes. Wheelbase is 2 ft. 10 in., length over buffer beams 7 ft. 9 in. and maximum hauling capacity about 100 tons. Curves of 30 ft. radius can be traversed.

Roof Sewing in Norwegian Mine

A unique ground support method, termed "roof sewing" and similar in function to roof bolting, has been devised at the Sulitjelma mine, Norway, and was recently described in *Engineering and Mining Journal*. The ore at this A/S Sulitjelma Gruber property is 1 to 2 m. in thickness, is approximately horizontal on the strike 400 to 600 m. in width with a dip from 10 to 15 deg., and lies beneath a laminated schist top.

Cribbed pillars of schist blocks are used to support the top, and conventional split and bolts with wedges are also used to support the top. This method is now being used in the stopes.

Two methods, identical in principle, are used where particularly dangerous top is encountered and where the normal roof bolt provides insufficient support. In this method, named "roof sewing," the roof is hung on wire rope.

Holes 32 mm. in diameter are drilled at 2 to 3 m. into the top and ½ in. wire rope loop is pushed to the top of the hole. The rope extends to the next hole 2 or 3 m. away and the wire rope loop is pushed to the top again. This procedure is repeated indefinitely. The rope between the holes is not cut, hangs between the holes and has no function.

A ¼ in. pipe is also pushed to the top of the hole. Next, a short piece of ¾ in. pipe, about 9-10 in. with a cement gun connection, is placed in the hole. Then a solid plug of silex is pushed into the hole about 4-5 in. around the outside of the ¾ in. pipe, the ¼ in. air vent pipe and around the two strands of wire rope. This silex hardens in a few minutes and will stand the cement gun pressure of approximately 300 lb./sq. in.

A hand pump is used to pump cement grout into the drill hole and into the cracks and fissures which the drill hole has cut. Air is ejected through the air vent pipe as the cement grout rises in the hole and is eventually filled with the grout.

The success of the method is attributed to the fact that loose rock is cemented to a solid block which is suspended by the wire rope loops in the drill holes from solid rock overlying the loose rock. The system has been used for about seven years. No installation has been reported as a failure.

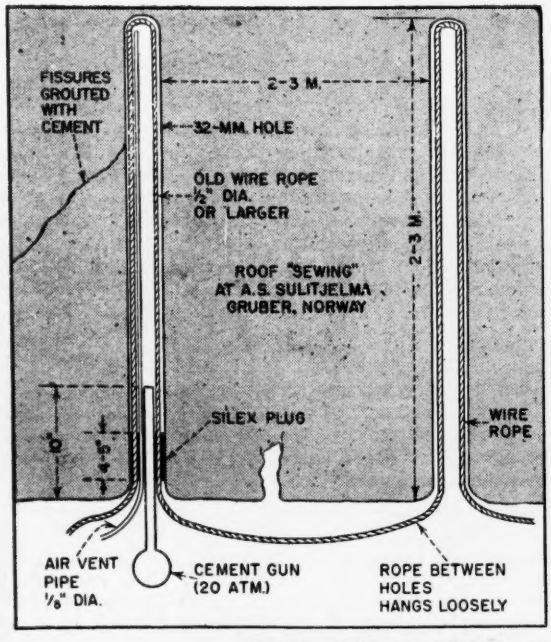


Illustration: Engineering and Mining Journal

The sequence of roof sewing

Moving Colliery Refuse by Dump Truck

Under increasing pressure from Town and Country Planning authorities to reduce the ugliness and nuisance of colliery dirt tips, the N.C.B. has begun a series of trials with large-capacity motor dump trucks at Arkwright Colliery, near Chesterfield. The object of the tests, which are to be watched by senior members of the Board's Planning, Engineering and Coal Preparation branches, is to ascertain whether, by the use of motor trucks, colliery refuse tips can be made less ugly.

The traditional methods of dirt disposal, by overhead ropeway or by elevation on to a fixed heap, allow little flexibility in the construction of the heap, or require a large labour force and additional equipment if the heap is to be flattened. By the use of dump trucks greater flexibility can be achieved, the dirt can be better disposed so as to reduce local nuisance, and with heavy vehicles the surface can be compacted to prevent spontaneous fires.

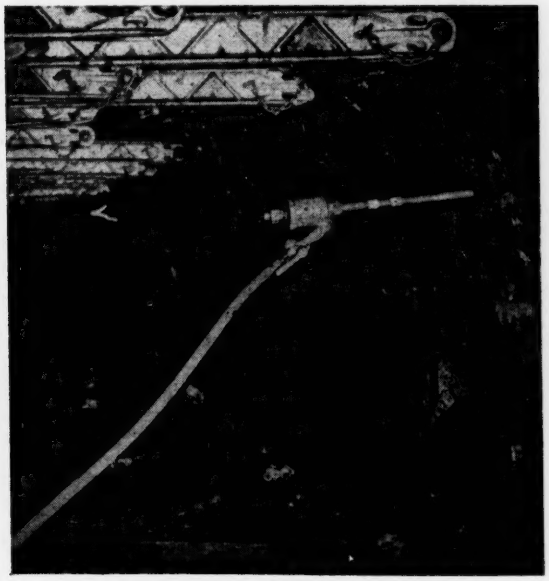
A series of tests has now been designed to enable the Board to watch the performance of the leading makes of truck in this country. Four companies, A.E.C., Euclid, Foden, and Scammell, are providing trucks, and for the first part of the tests these trucks will be tried out with loads of colliery refuse over particularly heavy going as well as negotiating a normal colliery circuit. In the second part of the tests, each manufacturer in turn will take over for a whole day the disposal by dump truck of the entire "make" of dirt and stone from the colliery.

The trials will be timed, but the Board will not try to ascertain the relative performance of individual machines so much as to obtain for planning purposes a good average figure in terms of ton mileage, for a 10 yd. class of dump truck. The trials will continue after dark.

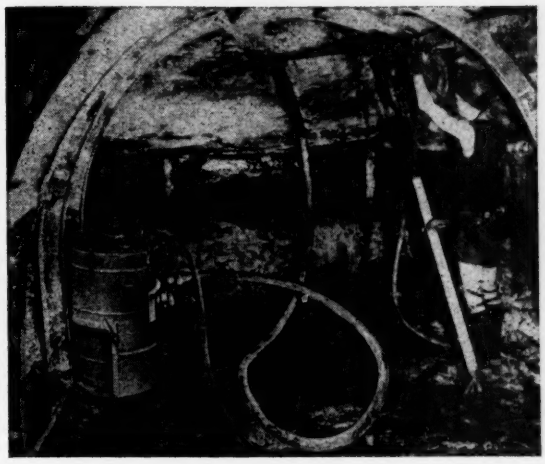
Dust Prevention and Suppression

In his report for 1951, H.M. Chief Inspector of Mines stated that it might, in the near future, become imperative to establish a time limit after which drilling in stone should only be done with effective dust suppression. More interest is being taken in the dust problem in mines to-day than in any previous period, firstly because of the recognition of the injurious effect of dust on health, and secondly, because of modern intensive mining methods which have the effect of "canalizing" the dust produced from larger outputs into fewer roadways.

The technique of water infusion opens out prospects in the safe exploitation of seams where dust is present, and in this connection the water infusion tube, manufactured by Hugh Wood and Co. Ltd., has been designed to improve the application of water infusion by simplifying the process of injection.



The water infusion tube



The dust extractor

The design embodies a mechanism by which the pressure of the water is utilized to operate a rubber seal which grips the side of the hole.

In its principles of construction and operation, the infusion consists mainly of two separate tubes, one of which fits closely into the other, the inner tube being moved in the outer by a piston attached to it. Water is admitted into the tube through a control cock, and passes into the cylinder through ports. The pressure of the water forces back the piston so that the inner tube is withdrawn in the outer and a rubber seal expands to grip the hole. When the hole has been infused the cock is turned at right angles to the pipe, and the water in the cylinder and inner tube is passed back through vents, thus releasing the pressure and allowing the tube to be withdrawn.

In conditions where the dust produced by the force of exhaust air on hole chippings proves injurious to health, the Huwood dust extractor is claimed by the manufacturers as an effective preventative. The extractor comprises a metal sleeve through which the drill rod operates, connected by a hose to a suction tank. In this tank compressed air is forced from the ejector in the cone, and passes over the baffles in the lid. This causes a drop in reservoir pressure and, through the hose, in the air being drilled. The drillings are then sucked to the reservoir. Small particles are trapped by the grease with which the baffles in the lid are smeared, and the latest unit is fitted with a variable jet which eliminates the separate nozzles carried in earlier models.

New East German Cable

The Koepenick cable works in East Germany have produced a plastic-insulated ground cable which is claimed to meet all requirements according to a recent report from Leipzig. As the polyvinyl chloride, which is the basic insulation material, is not absolutely moisture-proof, the inner layer is covered with several layers of aluminium foil which is coated and sealed with a special bituminous substance. The diffusion of the bitumen in spraying is claimed to be ten times as effective as in previous bitumen-coating processes for cables and greatly lengthens the life of the cable. The foil-and-bitumen layer is covered by another layer of tough plastic, on top of which is the normal protective layering for ground cables.

Worm Reducers for Cyprus

A consignment of Radicon worm reducers recently left David Brown and Sons (Huddersfield) Ltd., for the plaster board and gypsum factory of the Hellenic Mining Company, Nicosia, Cyprus, where they will be used in conveyor drives. The full order, received through the General Engineering Co. Ltd., of Nicosia, was for thirteen units, all of 60/1 ratio, to reduce driving speeds from 1,440/24 r.p.m. All the units were of the R.H.U. type, five 5 in. (3 h.p.), five 7 in. (5 h.p.), two 8 in. (8 h.p.) and one 10 in. (12 h.p.).

REVIEWS

Statistics for Technologists, *by C. G. Paradine, M.A. (Cantab.), and B. H. P. Rivett, M.Sc. (Lond.). Published by English Universities Press Ltd. Pp. 288 with index and appendix. Price 25s. net.*

The authors of the work under notice are respectively senior lecturer in mathematics at Battersea Polytechnic and head of the Field Investigation Group, National Coal Board. The book is intended as an introduction for students, research workers and engineers to the principles of statistical method and theory. The treatment adopted is a deliberate compromise between a purely mathematical account and an account of methods only, the purpose being to make the user of the methods aware of the reasons for the use of the methods, as well as the assumptions made in the selection of them. This method is a derivation of modern trends, as during recent decades there has been a considerable raising of the standard of the mathematics required for degrees, and this book steers the middle course of explaining rules of procedure in relation to the underlying mathematical theory.

Chapters discuss in turn frequency distribution, probability, sum of squares, quality control, the analysis of variance and correlation, among other subjects. The preliminary theory discusses frequency distributions and parameters, probability and probability distributions, and these are then applied to the principal significant tests. Quality control and sampling inspection schemes are next discussed, and the remaining chapters deal with aspects of associated measurements.

A notice on the fly-leaf indicates that the reader who has not the mathematical equipment to follow the proofs in detail needs only a knowledge of algebraic notation to appreciate the line of argument and utilize the conclusions. A valuable book.

Economic Bulletin for Europe, *Vol. 5, No. 2, First Quarter, 1953. Prepared by the Research and Planning Division of the Economic Commission for Europe. Pp. 112. Price 3s. 9d. Available from all sales agents for United Nations publications.*

The introductory 24 pages of this publication deal exclusively with a review of the economic situation in Europe during the first quarter of 1953.

It will be recalled, the Bulletin points out, that there was little change in the established trends in economic policies and developments in Eastern Europe, although the second quarter was marked by striking changes in policy, of which a preliminary account is given. In Western Europe, on the other hand, there were few notable changes in either trends or policies during the first quarter of the year, while in the field of trade and payments the most notable development was the virtual extinction of Europe's dollar deficit on current account, without taking account of U.S. aid.

Special articles in this issue deal in turn with developments in trade between Eastern and Western Europe from 1951 to 1952, and national budgets in Western Europe; the latter article telling of post-war experiments in national income forecasting in the United Kingdom, the Netherlands and in Scandinavia. European economic statistics are tabulated in the usual manner, so that the whole work is complete and presents a most worthwhile survey of the period covered.

The Composition and Origin of the Antrim Laterites and Bauxites, *by V. A. Eyles, B.Sc., with mineral determination by X-Ray methods by F. A. Bannister, M.A., Sc.D., and G. W. Brindley, Ph.D., F.Inst.P. and J. Goodyear, Ph.D., A.Inst.P. Published by H.M. Stationery Office, Belfast, as Government of Northern Ireland Memoirs of the Geological Survey. Pp. 90 with index. Price 12s. 6d. net.*

The occurrence in Northern Ireland of beds of iron ore with which are associated highly aluminous clays, intercolated on a particular horizon within the Tertiary lava succession, has long been known. Between 1940 and 1943 a search for bauxite of economic value resulted in the accumulation of much new information about the laterites in general and about the aluminous laterites, or bauxites, in particular. The author commenced field work on the lateric deposits of the interbasaltic horizon in County Antrim in July, 1940, and subsequently provided six-inch geological surveys to provide for bauxite boring programmes.

This account deals especially with the nature of the chemical changes accompanying and constituting the process of lateritization, and with the chemical and mineralogical composition of the laterities themselves, particularly the bauxites. It is shown that everywhere in Northern Ireland the formation of laterite is preceded by kaolinization of the parent rock.

The conclusion is reached that the Irish bauxites are essentially gibbsite bauxites with a considerable clay mineral content. The presence of other minerals is discussed, and reference is made to the occurrences of an abnormal variety of bauxite containing chamasite. In addition, the metamorphic changes produced in bauxite, either as a result of contact with basalt dykes or through the heating of the laterites by the overlying lavas, are discussed.

The work finally makes suggestions as to the geological conditions controlling the occurrence of the several hydrated oxides of alumina in bauxite, and the whole constitutes a revealing report.

Stewarts and Lloyds Review 1903-1953.—*Published by the Publicity and Publications Department, Stewarts and Lloyds Ltd. Illustrated in line and half-tone. Pp. 169. Price 6d.*

The special issue heralds 50 years of effort on the part of Messrs. Stewarts and Lloyds Ltd., although it does not purport to be a comprehensive history of the company. It is rather an illustrated commentary of major events within the organization, both at home and overseas, set against an internationar background.

Opening with the contemporary scene of 1903, the volume tells its story in a fascinating manner until the contemporary scene of this year of Grace is reached. The interesting pages tell of the development of the company, and give revealing insight to its products in all parts of the world. In all, this special issue of the *Stewarts and Lloyds Review* is worthy of the anniversary it commemorates.

British Iron and Steel Federation Statistical Year Book for 1952.—*Part 1, United Kingdom Statistics. Pp. 114. Price 7s. 6d.*

The volume under notice enhances the important contributions of its predecessors and heralds some important changes in matter to that presented in previous editions. As against the various additions and changed presentation forms, as in the finished steel, overseas trade and imported ore sections, stands the omission of data on the distribution of finished steel by industry. These latter statistics had to be abandoned when the steel distribution scheme was reintroduced in February last year, although preparations have been made for statistics again to be collected on this basis since the relaxation of control last May. A useful list of definitions is included which provide aid in consideration of the statistics, and the whole is in keeping with the tradition of usefulness associated with these publications.

Royal School of Mines Journal, No. 2, 1953.—*Pp. 72 of editorial matter.*

This current issue of the *Royal School of Mines Journal* contains a wealth of good reading matter, and throughout the issue it is noticeable that instruction and the spirit of team harmony run strongly side by side. In all, this is a most impressive publication, and amongst the article matter presented are such widely divergent topics as extraction metallurgy, the coinage of the United Kingdom, the mining industry of Bolivia and practical training and the undergraduate. The whole is well illustrated and is well fitted to be published under the auspices of the Royal School of Mines.

METALS, MINERALS AND ALLOYS

COPPER.—The scarcity of prompt metal has led to a further rise in Metal Exchange prices which advanced to £242 10s./£247 10s. on Tuesday morning. However, in the afternoon, the Government Broker stepped in with offers of "contract copper" and after this the price declined and on Wednesday afternoon early November was done at £235 and 3 months £224. In the United States customs smelters have raised their domestic copper price to 29½ c. as supplies became tighter, and in view of the advances in London.

There is no definite news regarding labour developments in Northern Rhodesia but a delegation of the Executive Committee of the Northern Rhodesian African Mineworkers' Union has gone to Lusaka to see Mr. Williams, the Chief Secretary, regarding industrial relations between the companies and the Union.

The Copper Institute figures for September give production in the United States of crude as 79,479 s.tons (79,376 in August), and of refined at 114,760 s.tons (108,974 in August). Deliveries were 104,886 s.tons (106,985 in August), while stocks at the end of the month were 72,907 s.tons (78,825). While these figures show little change, outside the United States the picture is very different, production of crude was 120,013 s.tons (124,546). Refined production was 68,986 s.tons (90,340). Stocks, however, rose to a new record level at the end of September when they amounted to 236,336 s.tons compared with 209,220 at the end of August, which indicates that consumption was poor, deliveries to fabricators amounting to 47,039 s.tons (43,908 in August).

The news from Washington that negotiations on the sale of Chilean copper have been suspended "possibly for a long time," imports a serious problem for the future of the copper market. Except for sales by small producers to the Paipote national smelter which sends the raw copper to be refined in Hamburg and then sold there, and which may amount to some 14,000 tons, there has been a virtual standstill on Chilean copper sales since April, and the accumulated production is now estimated at around 150,000 tonnes. Anxiety is growing as to how much longer the government will be able to stand the strain of loss of revenue and income from foreign exchange. New banknote issues have been made and fresh levies and increasing taxes imposed, but it is not thought that the situation can continue beyond the end of the year, and that then the government will be forced to adjust its price to world levels. What these would be, if the whole 150,000 tonnes were dumped on the market, it is quite impossible to say. If the world price dropped to 24 c. the government's profit would disappear. The present world export price for electro in New York is 29.25-29.50 c. per lb.; the usually quoted price of 29.50-30 c. includes delivery to Valley Points.

LEAD.—Quotations on the London Metal Exchange have again advanced under the influence of the tight supply position. Though the New York quotation of 13.50 c. per lb. is unchanged the tone seems a little more confident and October domestic intakes were sold out last week. Domestic mine output continues to decline and at 25,930 s.tons in August was the lowest monthly return for five years. A recent overseas economic survey, emanating from the Board of Trade, stresses the steadily advance of French production, metropolitan and colonial, and the opinion is that this may provide an exportable surplus before long.

TIN.—Tin prices advanced sharply on the Metal Exchange since our last report, cash reaching £627 10s./£630 on Tuesday morning after which there was a reaction. The advance pulled up the New York price to 81 c. nom. but it was back to 80 c. on Wednesday. The backwardation has increased and is now about £20 a ton. There is little factual news to report. Production in the Belgian Congo in September was 1,716 tons compared with 1,057 in the previous month. Straits shipments for the first half of October are reported as 2,469 tons. Imports of concentrates into the U.K. in September were 4,834 tons of which Bolivia supplied the bulk—4,122 tons. World tinplate production, according to the International Tin Study Group, fell to 479,000 tons against 500,000 in July.

On the other hand there is a plethora of speculation and comment—often critical. The decision of President Eisenhower to go to the aid of Bolivia to the estimated tune of $27,000,000, including $18,000,000 for unwanted tin, is being contrasted with the treatment extended to tin producers generally by embargoes and propaganda in the past, especially at the expense of Malaya. Mr. Norman Cleaveland, president of Pacific Tin Consolidated Corporation, suggested in Washington recently that the purchasing policies of some of the major industrial users of tin are again being guided towards forcing prices to lower levels and that under the shelter of great government stockpiles such tactics are encouraged. Speculation is also active as to what will become of the 10,000 tons of tin recently purchased from Bolivia together with any further supplies from coming production as well as of the metal to be received next year from Indonesia and the Congo. Will it go to stockpile or be disposed of on the market? Thus, quite apart from the U.S. Government stockpile, which has long been assumed to be in the neighbourhood of 200,000 tons or possibly more, there will obviously be plenty of material for the next International Tin Conference to brood over.

ZINC.—Zinc shared in the general rise in metal prices on the London Exchange going to £76½ on Tuesday with a good turnover. In the United States Prime Western remains at 10 c. f.o.b. East St. Louis. During August U.S. domestic production declined further to 41,000 s.tons, the lowest figure since October, 1949. It is said that the progressive reduction in zinc smelting operations is creating some anxiety regarding future supplies of concentrates which are at present the main source for the production of germanium. But this apprehension is based on the expectation of an increasing demand for this rare metal which, it is thought, may treble over the next two years.

ALUMINIUM.—U.S. production in August again established a record with a total of 110,545 s.tons, making the eight months' output 818,521 s.tons. The U.S. Defence Department has issued what may prove an important ruling that the "Buy American" Act shall not apply to aluminium in any form so the military services and their contractors may use import material irrespective of it being cheaper than the domestic product.

No intimation has yet come from British Guiana of any interruption in the operations of the Demerara Bauxite Company as the P.P.P.'s efforts to promote a general strike have not so far been successful; in any case, the Alcan Works cannot import bauxite during the winter freeze-up in Canada and have to carry stocks to see them over until next spring. A possible reflection of the labour unrest in Guiana may perhaps be seen in the wage increases granted by Reynolds Jamaica Mines to Bustamante's Industrial Trade Union which have raised common labour rates to 16s. 3d. per day and up to £1 18s. for other categories.

QUICKSILVER.—Italian exports of quicksilver in August are reported as 269 tonnes compared with 63 tonnes in the corresponding month of last year. Total exports for the first eight months were 834 tonnes, against 634 in the same period last year. The U.S. price has slightly improved to $184/186 nom.

URANIUM.—The U.S. Atomic Energy Commission recently extended the expiration date of the guaranteed minimum base price schedule for Colorado Plateau ores—$1.50/3.50 per lb. uranium oxide—to March 31, 1962, and of the bonus for initial output up to 10,000 lb. of an equal amount to February 28, 1957. Lord Chewell has returned from Australia after his negotiations with Mr. Menzies regarding supplies and price to U.K. Mr. Beale, Australian Minister of Supply, said in Sydney this week that the world price for uranium oxide was about 24s. per unit. Apparently the British-United States combined development agency is paying much more.

Senator George Malone, chairman of a Senate sub-committee investigating stockpiles has stated that this body would examine the possibility of supplying U.S. requirements from domestic and Canadian sources instead of from the Belgian Congo and South Africa.

TUNGSTEN.—The Ministry of Materials has reduced its current price for tungsten concentrates 65 per cent to 280s. per ton unit for wolframite and for scheelite to 270s. delivered to consumer's works. There is nothing fresh to report regarding the market for tungsten ores which remains as dead as ever.

Iron and Steel

"Ishra" has begun to cash in on State steel. The terms of the public issue of 14,000,000 £1 ordinary shares in United Steel are now known, and although comparisons with the original price paid by the State for this gigantic undertaking are implicated by the disposal of the company's substantial holding in the equity of John Summers, it is clear that the return to private ownership will yield a substantial profit for the Iron and Steel Holding and Realization Agency. There is no question that the deal will go through. It has, in fact, been underwritten in the City, but the significant point about the higher capitalization is that it indicates a strengthening confidence in the outlook for the steel industry.

Current trading conditions reinforce that confidence. Production is rising rapidly. The October output figures may very possibly be the highest and the market is booming. It is mainly a domestic revival. The export market enmeshed in the entanglements of trade restrictions, and currency shortages, is still sluggish. But there has been a marked acceleration of orders and specifications from home industries which suffices to absorb the current output and ensure full employment to the end of the year.

There has been a vast improvement also in the provision of raw materials. The dimensions of the stockpiles of iron ore and scrap have been steadily increasing throughout the year, and fuel anxieties have been mitigated to some extent by the operation of new coke ovens.

Owing to the slackness in the iron castings trade there has been some diversion of blast furnace capacity. Less foundry iron and more steel-making iron is being produced. But a slightly better tone is noticeable in the foundry trade. The demand for foundry iron has improved and some consumers are now covering their needs to the end of the year.

The London Metal Market

(From Our Metal Exchange Correspondent)

Activity on the London Metal Exchange has increased slightly during the past week, and the tendency has been for prices to rise.

There has been a fair demand for tin in the East, and this has caused the forward quotation in London to firm up, and at the same time decreasing offerings of cash metal have resulted in the backwardation showing a tendency to increase. The Eastern price on Thursday morning was equivalent to £614⅞ per ton c.i.f. Europe.

The position in the U.K. for prompt lead remains one of scarcity, and works are finding it necessary to pay substantial premiums where metal is required for delivery within a few days: the October position has not deteriorated as there is still a steady flow of sales for the period: the forward market has benefited from the demand for cash and nearby metal, but it cannot be said that there is any real confidence in the present price level.

A fairly tight situation is developing for prompt and October zinc, which has resulted in the backwardation increasing, and simultaneously demand has sprung up for intermediate months causing the backwardation to be spread fairly evenly between October and January settlements.

The outstanding event in the copper market has been the offering in the open market of prompt metal by the Government Broker, as up to now the Government has only been supplying special shapes, etc., to consumers by arrangement. This development shows that the Ministry realize that at the moment the London Metal Exchange price for cash copper is the highest in the world, and that U.K. manufacturers are being hampered in the export trade: it will be interesting to see whether the Ministry maintain their selling price at a certain figure, or whether they will be prepared to follow the three months' price with a more or less fixed backwardation. Nothing further has been heard of the negotiations between America and Chile, and it is, therefore, reasonable to suppose that no real break in the copper price is imminent, as the Chileans are unlikely to take any action which might result in the lowering of the world price level until their attempt to sell their accumulated stock is concluded one way or the other. Although demand on the Continent remains good, sales from London have practically ceased owing to the rise in price, and this means that less physical metal is likely to be taken off the market after the end of the year.

Closing prices and turnovers for the week are given in the following table:—

	October 15		October 22	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Tin				
Cash	£607½	£610	£617½	£620
Three months	£590	£592½	£597½	£599
Settlement	£610		£617½	
Week's turnover	550 tons		265 tons	
Lead				
Current month	£91½	£92	£92½	£93
Three months	£88½	£89	£88½	£89
Week's turnover	2,875 tons		4,000 tons	
Zinc				
Current month	£73½	£73½	£75½	£75½
Three months	£70½	£70½	£71½	£71½
Week's turnover	3,075 tons		4,200 tons	
Copper				
Cash	£235	£237½	£232½	£237½
Three months	£222½	£223½	£224	£224½
Settlement	£237½		£237½	
Week's turnover	2,550 tons		3,225 tons	

OCTOBER 22 PRICES

COPPER, TIN, LEAD AND ZINC

(See our London Metal Exchange report for Thursday's prices)

ANTIMONY

English (99%) delivered, 10 cwt. and over .. .. .. £225 per ton
Crude (70%) .. .. £210 per ton
Ore (60% basis) .. .. .. 22s./24s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade) .. .. £483 per ton

OTHER METALS

Aluminium, 99·5% £150 per ton
Bismuth (min. 4 cwt. lots) 16s. lb.
Cadmium (Empire), 13s. 10d./14s. 4d. lb.
Chromium, 6s. 5d./7s. 6d. lb.
Cobalt, 20s. lb.
Gold, 248s. f.oz.
Iridium, £60 oz. nom.
Magnesium, 2s. 10½d. lb.
Manganese Metal (96%-98%) £280/£295
Osmiridium, £40 oz. nom.
Osmium, £65/£70 oz. nom.
Palladium, £7 15s./£8 10s. oz.
Platinum, £27/£33 5s.
Rhodium, £42 10s. oz.
Ruthenium, £25 oz.
Quicksilver, £61 15s. ex-warehouse
Selenium, 30s. 6d. nom. per lb.
Silver 74d. f.oz. spot and f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 50% 7s. 3d. lb. c.i.f.
40% 6s. 3d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (lumpy) £14 8s. 0d. per ton c.i.f.
" " (concentrates) £14 8s. 0d. per ton c.i.f.
" " Refractory £14 0s. 0d. per ton c.i.f.
Baluchistan Metallurgical .. £15 19s. 6d. per ton c.i.f.
Magnesite, ground calcined .. £26 - £27 d/d
Magnesite, Raw .. .. .. £10 - £11 d/d
Molybdenite (85% basis) .. 103s. 10½d. per unit c.i.f.
Wolfram (65%) .. .. .. World buying 265s./275s.
" .. .. .. 280s. nom. U.K. Selling
Scheelite .. .. World buying 255s./265s.
" .. .. 270s. nom. U.K. Selling
Tungsten Metal Powder .. .. 24s. 3d. nom. per lb. (98% Min. W.) (home)
Ferro-tungsten .. .. .. 20s. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £35 13s. 9d. d/d per ton
Ferro-manganese, home .. .. £49 15s. 0d. per ton
Manganese Ore Indian c.i.f. Europe (46% - 48%) .. .. .. 7s. 11d. - 8s. 7d. per unit
Brass Wire .. .. 2s. 5½d. per lb. basis
Brass Tubes, solid drawn .. 1s. 10d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The gilt-edged market started firm but later eased off. The improvement followed the Chancellor's optimistic Guildhall speech. Revenue figures were again better than in the corresponding period last year. The total overall deficit is now £596,500,000 against £706,600,000. Savings figures also showed some improvement. Details of the first re-sale of a major steel company to the public are outside the scope of this article, but it is expected to be a success. The immediate effect on gilt-edged during the next few weeks is likely to be one of stagnation, but later prices may well improve after cancellation of a considerable quantity of government stock.

The Anglo American group's September quarterly report stirred up the Kaffir market. In the finance group all the popular counters went ahead, particularly West Rand interests. Among individual mines, many of the older Rand properties remained unchanged but uranium producers and developers improved sharply. Daggafonteins were especially strong. Uranium profits for the September quarter came out at £228,000. This lifted Luipaards and Randfontein in sympathy. The latter property is rumoured to have the largest uranium plant in South Africa. West Rand Consolidated reported uranium profits of £186,509 against £157,413, gold returns being only slightly lower. Doornfontein have arranged private finance for immediate development, as the Board believe the time is not ripe for an approach to the public. This has lifted a cloud from the shares which rose in consequence. Witwatersrand Gold will probably close down and sell the plant in December; the company has recently been making considerable losses. Recent tests at Venterspost show that this property is unlikely to become a uranium producer.

Some of the most interesting results and best gains came from the O.F.S. The star turn was Western Holdings which produced the highest underground development results to date. These were values of some 2,025 in. dwt. over a limited stretch of 60 ft. The two shafts are now connected underground. Harmony launched their new issues. The new shares started at 2s. 3d. premium and the new notes at 1s. 3d. premium. President Brand maintained their good June development results, 96 per cent of the footage being payable. Free State Geduld rose on hopes that the good Western Holdings values may continue over the boundary. St. Helena, which borders the President Brand property on the west, also rose.

West Africans were little changed, but Ashantis picked up some of their recent losses despite the fact that they were quoted ex dividend. Taquah and Abosso is obtaining assistance from the Gold Coast Government to carry out development in a promising area. The terms of the loan, not yet signed, include a levy of 5s. per ton on the treatment of payable ore from the specified area and a lien on the company's housing. The chairman pointed out that ore now being mined was from the richer part of the reserves. This cannot be considered a very healthy position unless improved results are obtained in the future.

In the miscellaneous group. St. John Del Rey fell on the board's decision not to pay the interim dividend. This is due to the sharp fall in the value of the local currency, one of the risks that companies operating abroad to-day have to take.

Diamonds were good on reported French buying, De Beers Deferred and Preferred and Anglo American Trust being prominent. Platinums also rose sharply. The reports from the companies are due in a few weeks' time.

The leading copper shares were all up on the higher metal price. The Government Broker had to sell metal in the market to stabilize this. Esperanza were again higher. Buying followed the good results reported last week.

Tin shares were very patchy. Ayer Hitam fell due to recent difficulties with the dredge. Nigerians were mostly the turn better. Columbite prospects were spotlighted by the Naraguta dispute. Beralts fell following the cut in the price of wolfram.

	Price Oct. 21	+ or — on week
FINANCE		
African & European	2½	
Anglo American Corpn.	5⅝	+⅛
Anglo-French	17/3	—3d
Anglo Transvaal Consol.	20/-	
Central Mining (£1 shrs.)	28/-	
Consolidated Goldfields	49/6	+1/-
Consol. Mines Selection	24/4½	+7½d
East Rand Consols	3/-	+6d
General Mining	3⅜	+1/16
H.E. Prop	37/6	
Henderson's Transvaal	7/-	—6d
Johnnies	51/10½	—1/7½
Rand Mines	3⅞	+⅛
Rand Selection	31/3	+7½d
Strathmore Consol.	31/3	+3/9
Union Corp. (2/6 units)	27/-	—6d
Vereeniging Estates	3½	
Writs	33/1½	+1/3
West Wits	42/6	+1/10½
RAND GOLD		
Blyvoors	39/9	+6d
Brakpan	10/3	
City Deep	15/7½	—7½d
Consol. Main Reef	18/1½	
Crown	33/9	
Daggas	3¾	+⅛
Doornfontein	23/-	+1/6
Durban Deep	34/4½	
E. Daggas	13/6	+6d
E. Geduld .. (4/- units)	30/-	+7½d
E. Rand Props	2¾	
Geduld	4	
Govt. Areas	12/6	+9d
Grootvlei	22/-	+3d
Libanon	9/6	
Luipaards Vlei	23/6	+2/-
Marievale	17/9	
Modderfontein East	17/6	
New Kleinfontein	18/1½	
New Pioneer	17/9	+1/-
Randfontein	47/3	+5/6
Robinson Deep	11/3	
Rose Deep	12/6	
Simmer & Jack	4/9	
S.A. Lands	20/-	
Springs	4/4½	+1½d
Stilfontein	26/3	+9d
Sub Nigel	2⅛	—⅛
Van Dyk	4/6	—3d
Venterspost	13/-	+3d
Vlakfontein	13/3	+3d
Vogelstruisbult	32/6	+1/9
West Driefontein	6⅝	+⅛
W. Rand Consolidated	2 11/16	+3/32
Western Reefs	2 1/16	+3/32
O.F.S.		
Freddies	9/3	+6d
Freddies N.	9/-	+4½d
Freddies S.	8/-	
F. S. Geduld	2 17/32	
Geoffries	14/3	+3d
Harmony	22/-XR	
Loraine	7/3	
Lydenburg Estates	12/3	+1/3
Merriespruit	8/4½	+4½d
Middle Wits	15/3	+1/3
Ofsits	35/-	+1/10½
President Brand	28/1½	+1/7½
President Steyn	21/9	+3d
St. Helena	13/9	+9d
Virginia Ord.	12/1½	+7½d
Welkom	16/9	—3d
Western Holdings	3¾	+⅛
WEST AFRICAN GOLD		
Amalgamated Banket	1/9	
Ariston	6/-	+3d
Ashanti	20/9XD	+4½d
Bibiani	5/11½XD	—1½d
Bremang	2/1½	
G.C. Main Reef	3/6	
G.C. Selection Trust	6/1½	+1½d
Konongo	2/4½	
Lyndhurst Deep	1/-	
Marlu	1/4½	
Taquah & Abosso	3/-	
AUSTRALIAN GOLD		
Boulder Perseverance	2/6	
Gold Mines of Kalgoorlie	13/-	—4½d
Great Boulder Prop.	9/9	
Lake View and Star	14/9	+6d
Mount Morgan	17/3	
North Kalgurli	6/6	—3d
Sons of Gwalia	5/9	+3d
South Kalgurli	6/9	+3d
Western Mining	11/9	
MISCELLANEOUS GOLD		
Cam and Motor	9/6	
Champion Reef	4/9	—3d
Falcon Mines	7/-	—3d
Globe & Phoenix	23/-	—1/-
G.F. Rhodesian	5/6	+3d
London & Rhodesian	5/-	
Motapa	1/9	+3d
Mysore	3/4½	
Nundydroog	5/9	
Ooregum	4/3	+1½d
Oroville	11/6	—3d
MISCELLANEOUS GOLD (contd.)		
St. John d'El Rey	24/3	—2/3
Zams	30/6	
DIAMONDS & PLATINUM		
Anglo American Inv.	3 3/32	+1/32
Casts	22/-	+9d
Cons. Diam. of S.W.A.	4½	
De Beers Defd. Bearer	64/-	+3/9
De Beers Pfd. Bearer	16½	+⅛
Pots Platinum	8/3	+1/1½
Watervaal	13/-	+2/-
COPPER		
Chartered	53/9	+6d
Esperanza	6/4½	+6d
Indian Copper	3/10½	
Messina	3 3/32	+1/32
Nchanga	6⅞	+1/32
Rhod. Anglo-American	49/6	+1/6
Rhod. Katanga	14/9	—1½d
Rhodesian Selection	15/7½	+4½d
Rhokana	18⅝	+1/16
Rio Tinto	20½	+½
Roan Antelope	15/4½	+3d
Selection Trust	33/3	+2/-
Tanks	57/6	+6d
Tharsis Sulphur Br.	42/6	
TIN (Eastern)		
Ayer Hitam	23/1½	—7½d
Bangrin	8/-	
Gopeng	7/9	+3d
Hongkong	5/9	—3d
Ipoh	14/4½	
Kamunting	8/9	+3d
Kepong Dredging	4/4½	—4½d
Kinta Tin Mines	10/-	
Malayan Dredging	25/-	+1/3
Pahang	13/9	+1½d
Pengkalen	8/-	
Petaling	8/-	+1½d
Rambutan	10/3	
Siamese Tin	8/3	+1½d
Southern Kinta	13/3	
S. Malayan	24/-	+6d
S. Tronoh	7/9	
Sungei Kinta	10/-	
Tekka Taiping	4/1½	—1½d
Tronoh	22/-	
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	10/-	
Beralt Tin	23/6XD	—6d
Bisichi	4/1½	+1½d
British Tin Inv.	12/3	+1½d
Ex-Lands Nigeria	3/6	
TIN (Nigerian and Miscellaneous) contd.		
Geevor Tin	9/9	+3d
Gold & Base Metal	3/4½	
Jantar Nigeria	8/6	+10½d
Jos Tin Area	11/4½	+1½d
Kaduna Prospectors	2/4½	+1½d
Kaduna Syndicate	2/4½	+1½d
London Tin	5/4½	+3d
United Tin	2/9	+1½d
SILVER, LEAD, ZINC		
Broken Hill South	2½	+⅛
Burma Mines	1/4½	
Consol. Zinc	23/6	+9d
Lake George	9/6	+6d
Mount Isa	31/6	+1/6
New Broken Hill	22/6	+9d
North Broken Hill	2 11/16XD	+⅛
Rhodesian Broken Hill	10/7½	+1½d
San Francisco Mines	17/6	
Uruwira	2/6	
MISCELLANEOUS BASE METALS & COAL		
Amal. Collieries of S.A.	43/-	
Associated Manganese	49/3	+4/3
Cape Asbestos	21/6	+4½d
C.P. Manganese	51/3	—7½d
Consol. Murchison	21/6	+1/-
Mashaba	4½d	
Natal Navigation	3⅛	
Rhod. Monteleo	2/6	
Turner & Newall	59/-	+1/3
Wankie	12/-	—1½d
Witbank Colliery	3 3/32	
CANADIAN MINES		
Dome	$28½	—¼
Hollinger	$23¼	+1
Hudson Bay Mining	$75½	+2½
International Nickel	$72¾	+2¼
Mining Corpn. of Canada	£3½	
Noranda	$121½	+2½
Quemont	£5½	+⅛
Yukon	3/9XD	
OIL		
Anglo-Iranian	7⅛	—1/16
Apex	2 1/32	+1/32
Attock	35/7½	+1/10½
Burmah	56/10½XD	
Canadian Eagle	29/7½	+1/-
Mexican Eagle	23/1½	+3d
Shell (bearer)	4⅜	+⅛
Trinidad Leasehold	29/6	
T.P.D.	24/6XD	+1/9
Ultramar	26/7½	+1/7½

COMPANY NEWS AND VIEWS

Some Central Mining Group Results

Five companies in the Central Mining Group has now published their reports and accounts for the year ended June 30 last. The operating results of four of these companies, Blyvooruitzicht, Modderfontein East, Consolidated Main Reef and New Modderfontein are given in the table below while Central Mining Free State Areas is dealt with separately.

Blyvooruitzicht Gold Mining

Company	Year to June 30	Milled tons (000)	Grade (dwt.)	Yield (oz.)	Profit per ton s. d.	Ore Reserves Tons (000)	Ore Reserves Grade (dwt.)
Blyvooruitzicht Gold Mining	1953	1,219	12.0	732,733	104 5	5,515	12.3
	1952	1,298	12.6	819,176	118 7	5,527	12.5
Modderfontein East	1953	1,238	2.3	159,447	4 1	2,570	3.0
	1952	1,409	2.3	165,656	6 1	2,646	3.1
Consolidated Main Reef	1953	2,107	2.8	293,871	3 3	2,695	3.6
	1952	2,283	2.7	312,352	5 8	4,337	3.4
New Modderfontein	1953	94	3.8	18,017	11 6	N.A.	N.A.
	1952	209	2.9	30,536	4 3	N.A.	N.A.

Shortage of underground labour and severe restrictions on power supplies were responsible for the lower tonnage milled and the decline in the development footage advanced by 1,730 ft. to 39,733 ft.

Total untaxed profits amounted to £6,425,796 and the net profit for the year was £3,506,861 (£3,708,738) which included £21,710 being the net profit—subject to adjustment—from uranium. The dividend was maintained at 2s. 10d. per 2s. 6d. share on the £3,000,000 issued capital which required £3,400,000 leaving the forward balance at £1,359,814 compared with £1,252,788 brought in.

Modderfontein East

Although the tonnage milled during the year to June 30 last showed only a modest decline of 27,000 tons, there was a decrease in the development footage accomplished by 2,138 ft. to 13,097 ft. Development work was largely confined to the Klipfontein Corridor lease area where the northern portion gave low percentage payability but the southern portion yielded 58,000 tons of ore.

The total untaxed profit was £311,383 but after providing for taxation and mineral lease consideration totalling £115,363 (£174,278) leaving a net profit for the year of £182,564, compared with £65,147 for the preceding year. The dividend distribution was cut back to 3s. per £1 share on the £930,805 issued capital, which required £139,621 compared with £209,431 distributed in the preceding year when the company paid 4s. 6d. per share. The forward balance at the financial year end was £295,724 compared with £329,425 brought in.

Consolidated Main Reef

The decline in the tonnage milled during the year to June 30 last by 176,000 tons or nearly 8 per cent, was due mainly to the shortage of underground labour which also led to a considerable curtailment of development work. This fact, together with the decline in the percentage payability experienced and an increase in the working costs per ton milled made serious inroads into the ore reserve position which contracted by as much as 1,642,000 tons. As the prospective ore reserves of the mine are small, the Directors, in commenting on the mine's general position, stated that under present conditions the scale of operation must decline over the next few years. During the last six months of the financial year under notice the profits from the mine averaged only 2s. per ton milled—excluding the sale of gold at enhanced prices.

New Modderfontein

Mining operations were conducted on a very small scale during the year and less than 95,000 tons were milled. Most of this tonnage—88 per cent—came from underground and the remainder from clean up operations. The directors state that satisfactory progress is being made with the dismantling and sale of plant, a total of £18,663 being realized from this source during the year. The total untaxed profit amounted to £84,260. Taxation required £24,613 (£945) and after making provision for a return to shareholders of 6d. per share in cash, which required £70,000, the forward balance at the end of the company's financial year was £162,286, compared with £175,506 brought in.

Central Mining Free State Areas

This company's investments continued to be confined to shares in Union Free State Coal and Gold Mines (In Voluntary Liquidation), Harmony Gold and New Consolidated, Free State, Exploration Company. The total book value of these investments at the end of June last was £2,447,124 which compared with the Stock Exchange value at the same date of £2,484,024.

West Drie, Venterspost and Doornfontein

Three companies in the Consolidated Gold Field Group, West Driefontein, Venterspost, and Doornfontein, whose financial years ended on June 30 last, have now published their report and accounts.

West Driefontein

Company	Year to June 30	Milled tons (000)	Grade (dwt.)	Yield (oz.)	Profit per ton s. d.	Ore Reserves Tons (000)	Ore Reserves Grade (dwt.)
West Driefontein Gold Mining	1953	388	13.5	261,743	108 0	N.A.	N.A.
	1952*	115	8.5	49,193	43 4	N.A.	N.A.
Venterspost Gold Mining	1953	1,219	4.6	285,070	13 1	2,496	5.6
	1952	1,180	4.4	260,648	14 3	2,533	5.4

* Five months ended June 30, 1952.

The report and accounts of West Driefontein tells a story of rapid progress and unqualified success. But as the company did not come into production until February, 1952, it is not possible to give comparative figures. Nevertheless, the results for the year to June 30 last are impressive by any standards. The grade of ore sent to the mill during this period was 13.5 dwt. per ton, which enabled the working profit per ton to average out at 108s. per ton, which compares with a working profit of only 43s. 4d. per ton recorded in the first five months ended June 30, 1952. The net profit for the year expanded from £250,621 for the five months' period ended June 30, 1952, to £2,068,738 during the year under review out of which taxation took £139,415 (£7), the sum of £1,753,296 (£250,614) was allocated to general reserve, while the payment of the maiden dividend of 6d. per 10s. share on the £3,520,540 issued capital required £176,027.

The company is a scheduled uranium producer and on September 25 last it was announced that its uranium treatment plant would be constructed with a capacity sufficient to handle the uranium-bearing slimes from Doornfontein Gold as well.

Venterspost

Although Venterspost milled 39,000 tons more during the year to June 30 last, than in the preceding year, working costs rose by 3s. 7d. to 46s. 3d. per ton milled and prevented this initial advantage from making itself felt and the working profit at £798,850 was lower by £41,489 than in the preceding year. Profit before tax was £768,749 (£808,833), taxation was also less, £217,961 against £224,054, but the allocation to general reserve was higher at £348,483 against £333,398. The total dividend distribution was reduced by 4d. to 10d. per 10s. share on the £2,450,000 issued capital, leaving the carry forward at the financial year end at £7,107, compared with £8,968.

Doornfontein Gold

Commenting on the general position of Doornfontein, the directors state that the speed with which the mine has been opened up exceeded expectations, progress which can be largely attributed to the absence of any large inflows of water. This is of considerable importance for it will enable the No. 1 shaft to be available for hoisting by the middle of 1955 instead of as previously estimated as sometime in 1957. Development work proceeded rapidly during the year with excellent results, 85.2 per cent of the footage sampled, or 10,170 ft., proving payable at an average value of 8.7 dwt. per ton over an estimated stoping width of 45.0 in. equivalent to 392 in. dwt. Thus it is now believed that the area to be served by the No. 1 and Annan Shafts contains sufficient ore to justify a higher milling capacity than the original figure of 48,000 tons per month. The company's technical advisers have reported that the mine will be in a position to crush 40,000 tons per month commencing November, 1953, and have recommended that arrangements be made for a scale of operations aiming at 100,000 tons per month at a much earlier date than previously thought possible.

This programme for a more rapid expansion will entail the raising of fresh funds through the market subsequently, but meanwhile the company can draw up to £1,000,000 before June 30, 1954, from the National Finance Corporation of South Africa with whom an agreement was concluded for this purpose on July 29 last. At October 12, the company had drawn £400,000. Additionally, the company has arranged for a running loan of up to £700,000 repayable on or before December 31, 1954, and bearing interest at the rate of 6 per cent per annum from Anglo American Corporation, General Mining, New Consolidated Gold Fields and Central Mining. Doornfontein has not, as yet, availed itself of these facilities.

Total income of Doornfontein for the year to June 30 last was £38,145 (£33,129) but after general charges of £93,511 (£68,897), the net expenditure rose from £228,255 to £320,509.

Anglo-Ecuadorian's Record Output

The expansion in trading and other profits of Anglo-Ecuadorian Oilfields for the year ended March 31 last, from £847,139 to £1,057,387, reflected the record crude oil production achieved of 298,476 tons compared with 269,130 tons for the preceding year. The output figure was, in fact, a record for the Field, the previous highest production being 281,663 tons recorded in 1939-1940. Indeed, the financial results would have shown an even more marked improvement had it not been for the necessity to import refined products—at a considerable financial loss to the company—in order to satisfy the demand of the Ecuadorian market.

Lord Forres, chairman, in his statement accompanying the accounts, said that the improvement in production was entirely due to oil from shallow wells, production from deep wells showing a decline of 7,539 tons compared with the previous year. Moreover, efforts to find a new deep oil pool were unsuccessful and the company has decided not to drill further test wells over a portion of its northern concessions. However, the Santo Tomás area continues productive and the company's refinery has been operating at its full capacity of just over 200,000 tons a year.

The profit and loss account showed that the net operating income and sundry receipts, after providing for taxation in Ecuador, advanced from £834,803 to £1,044,057. This was augmented by income from investments (gross) of £13,330 (£12,336), bringing the total revenue figure for the year to £1,057,387, an increase of £210,248 over the preceding year. Amortization, depreciation, and development expenditure for the year written off remained virtually unchanged, £448,866 against £442,178 and after providing £410,106 (£257,078) for U.K. taxation, and taking into account an amount of £10,000 written off subsidiary companies' shares and advances, the net profit for the year was £188,846 compared with £139,242 in 1952. The allocation to reserves was nearly doubled, £110,322 against £56,561, and after maintaining the dividend distribution at 10 per cent per £1 stock unit on the £1,500,000 issued capital, the forward balance was left slightly lower at £141,513 compared with £145,489 brought in.

Two other points of interest commented on by Lord Forres concerned the company's entry into the Canadian oilfields (in partnership with other British oil companies) and also his disclosure that new capital expenditure over the year amounted to approximately £400,000 expended on the acquisition of new drilling machinery, well pumping plant and further outlays in respect of the new tanker, *Quito*.

The main cause for anxiety at the moment is obviously the question as to whether the company can persuade the Ecuadorian Government to authorize increases in the sales prices of refined products which have not been amended since 1948, despite the fact that since that time the cost of both materials and labour have continued to rise.

Rt. Hon. Lord Forres is chairman. Meeting, London, November 3.

British Burmah Petroleum Pays 5 Per Cent

The British Burmah Petroleum Company, whose control and management was transferred to the Union of South Africa on April 1, last, has recommended the payment of a dividend of 5 per cent per 4s. share for the year ended March 31 last.

This distribution was made possible by the saving in interest payment on the 5½ per cent debenture stock and the satisfactory progress achieved by the subsidiary, The British Burmah Petroleum Co. (S.A.) (Pty.), which earned a profit of £47,651. It was mainly this profit which enabled the consolidated profit and loss account to disclose a group profit of £46,264 as against the previous year's profit of £46,978, which latter figure, however, included an extraneous item of £8,578 in repect of certain investments realized.

Mr. A. P. Faickney, chairman, in his statement to shareholders said that little progress had been achieved with the company's suit brought against the Government of Burma for the destruction of the company's assets ordered by the then Government of Burma as a war measure. Moreover, he could not report any finality in respect of the negotiations in progress with the Burmese Government for it to participate in the oil industry of Burma, which is being operated under the management of the Burma Oil Company.

The Group's interests are now predominantly centred round its South African subsidiary and various adjustments have been made to the balance sheet in order to present a more realistic picture of the company's present position. Apart from its 2½ per cent interest in the Merger of the oil interests in Burma the company continues to hold substantial interests in Anglo-Transvaal Consolidated Investment Company, South African Torbanite Mining and Refining Company, and Masonite (Africa) Ltd., in addition to holding the managing agencies of "Satmar" and of Colas South Africa Ltd. Mr. A. P. Faickney is chairman. Meeting, Johannesburg, October 27.

Trinidad Petroleum Pays More

Trinidad Petroleum Development Company has recommended the payment of a final dividend on the ordinary 5s. stock units of 14¼ per cent, free of tax, making 18½ per cent, free of tax, for the year ended July 31 last, which compares with last year's total distribution of 16½ per cent, free of tax.

That the company was in a position to make a higher distribution arose largely from its increased crude oil production, which at 3,424,409 bbl. was the highest figure obtained for the past 12 years and compared with 3,091,175 bbl. in the preceding year.

The profit and loss account showed that the balance from production account and other income amounted to £1,835,292 against £1,787,483, an increase of £47,809. The net profit, after tax, was £291,343 against £237,063, and the carry forward at the company's financial year end was slightly stronger at £200,879 compared with £200,230 brought in.

Of the £1,000,000 issued ordinary stock units, 50 per cent is owned by British Controlled Oilfields. Mr. Kenneth A. E. Moore is Chairman. Meeting, London, October 29.

Poll on Re-election of Naraguta Tin Directors

As was to be expected yesterday's meeting of Naraguta Tin Mines proved indecisive on the issue of the re-election of the retiring directors, Mr. Herbert T. Skipp (the chairman), and Mr. Homfray Ogle, which was being opposed by shareholders associated with the Parish Group who had nominated Mr. C. W. Loch and Mr. H. G. Hall in their place. A poll has been demanded on all the resolutions relating to these appointments, the result of which is not expected to be known before we go to press.

The opposition shareholders were content to let their case rest on the circulars they had already sent to shareholders, and did not avail themselves of the opportunity provided by the meeting either of developing their case against the present directors in greater detail or of giving shareholders any more precise idea of what they have in mind in proposing to sell off some or all of the company's properties. Nor did any of the 40 odd shareholders present show any inclination to elicit further information. At this writing it is therefore virtually impossible to give any indication of what is likely to happen to the company if the opposition shareholders carry the day, beyond the expressed intention of the latter to pay a much increased final dividend for the year to December 31 last.

Company Shorts

North Broken Hill Pays Less.—Pending receipt from Australia and the issue of the Directors' Report, Austral Development has issued a preliminary profit statement for North Broken Hill covering the company's operations for the year ended June 30, 1953.

Year to June 30	*Total Income*	*Total Expend.**	*Net Profit*	*Dividend Distribution*		*Carry Forward†*
	£	£	£	%	£	£
1953	6,333,706	4,733,648	1,600,058	90	980,000	1,262,281
1952	8,819,101	6,252,930	2,566,171	170	1,350,000	1,628,118

* Including taxation, depreciation, and administration expenses.
† After crediting £139,105 from unexpended appropriation for new plant and mine development, and after providing £75,000 for accrued long service leave.
* Expenditure on regrouping of labour charged to appropriation account.

The announcement also states that North Broken Hill's total ore reserves at the end of June last amounted to 4,702,000 tons as compared with 4,832,000 tons in the preceding year.

Malaysiam Tin Passes Dividend.—Preliminary profit statement issued by Malaysiam Tin announces that no dividend will be paid in respect of the year ended March 31 last.

Year to Mar. 31	*Working Profit*	*Taxation*	*Net Profit*	*To Reserve*	*Other Expen.**	*Carry Forward*
	£	£	£	£	£	£
1953	18,221	7,026	11,195	12,000	Nil	1,490
1952	7,774	3,044	4,734	3,000	4,692	2,295

Output of tin concentrates during the year ended March 31 last, was 67 tons representing an advance of some 12 tons compared with the preceding year. This improvement has been maintained during the first six months of the current year, the total output being nearly 47 tons compared with only 33 tons in the corresponding period of the year under review. Meeting, London, December 2.

Harmony's New Share Issue.—The terms on which Harmony Gold Mining will raise £4,306,667 of new money was announced at the end of last week and will take the form of an issue of 2,040,000 shares at 5s. each at 20s. per share and of

£2,266,667 6 per cent Registered Unsecured Convertible Notes at par. The Ordinary shares will be offered to shareholders registered on October 19, in the ratio of 3 new for every 20 held and the notes in the ratio of 1 note of £1 for every 6.

The notes will be convertible into shares on the basis of 5 shares for every £6 of notes at any time up to the end of 1955 and will be redeemable at par in the years 1957-1963 inclusive.

Underwriting has been undertaken jointly by Central Mining and Investment Corporation, Anglo American Corporation of South Africa, New Consolidated Gold Fields and New Union Goldfields. Expenses in connection with the issue are estimated at £130,000.

KENT (F.M.S.) TIN DREDGING LTD.

MR. STANLEY WICKETT'S STATEMENT

The Twenty-sixth Ordinary General Meeting of Kent (F.M.S.) Tin Dredging Limited was held on October 21, 1953, at the Registered Office, Redruth.

Mr. Stanley Wickett (Chairman) presided.

The Report and Accounts for the year ended December 31, 1952, having been circulated for the prescribed time, were taken as read, as was also the Chairman's Statement, circulated with the Reports and Accounts, which was as follows:

THE ACCOUNTS

The Accounts for the year ended December 31, 1952, submitted herewith show a gross profit of £171,565 compared with £245,961 in 1951.

Royalty of £51,577 paid to the Malayan Government as Export Duty on tin ore is not included in the gross profit figure of £171,565. United Kingdom and Malayan Taxation required a further £110,911 making a total of £162,488 contributed by the Company to Government funds.

After writing off £6,459 from Capital Expenditure and transferring £13,873 to General Reserve, Shareholders received Dividends of 70 per cent, amounting to £38,587 net. The Directors propose that the balance standing to the credit of Profit and Loss Account, which was increased from £30,203 to £31,843, be carried forward to the current year.

Results of the year under review must again be regarded as exceptional, the average price received for tin ore having been satisfactory. The dredge continued to work ground above the average grade of the property.

Comparative statistics and an outline of conditions and work at the Mine are given in the Report of our General Managers, Messrs. Osborne and Chappel. It will be noted that the equipment for oil firing the dredge boiler was installed and brought into service. Also that after the successful diversion of the Batu River to the new channel, to which I referred last year, the dredge was turned and in December commenced to work the land set free by the deviation.

Since the close of the year under review Shareholders have been advised of quarterly outputs of tin ore as follows:

January-March, 1953	...	2,060 piculs = 122½ tons tin ore.
April-June, 1953 ...	...	1,525 piculs = 90¼ tons tin ore.

Our General Managers anticipate that somewhat lower but satisfactory outputs should be obtained during the second half of the year from ground ahead of the dredge.

TIN PRICE

The tin price continued to be satisfactory until April, 1953, when the price fell by approximately £200 per ton metal and was followed by a rapid decline to the very low level of £568 per ton of metal, equivalent to £409 per ton of tin ore. Since then there has been a small recovery, but the price remains at an uneconomic level for the majority of both Chinese and European mines in Malaya, as in other tin producing countries. It has recently been announced that the Malayan and United Kingdom Governments are in favour of reconvening the Geneva Conference. If the conference is held, we must hope that no attempt will be made to stabilize the price of tin too near the present low level. It is the variation in consumer demand which has so influenced the variation in the price in the past and a first essential is a more stable buying policy on the part of consumers.

The welfare of Malaya's two principal industries—tin and rubber—is essential in the fight against Communism and in this connection the notable improvement in the Security position has brought some welcome relief to all who continue to take a leading part in industry and defence arrangements. On behalf of Shareholders I thank our General Managers, Staff and the labour force for their loyal services.

The Statement of Accounts and Balance Sheet, together with the Directors' Report, were received and adopted.

POWELL DUFFRYN LIMITED

The annual accounts to March 31, 1953, were presented at the annual general meeting, held on October 21. The following is an extract of the statement of the Chairman, **Sir Herbert Merrett:—**

Expansion of activities and many changes have occurred since our properties were nationalized. We have not been entirely successful in everything we have attempted but, engaged as we are in many businesses in all parts of the world, we must be satisfied if on balance we make progress and satisfactory profits.

In an attempt to hasten proceedings under the Coal Industry Nationalization Act, I have been in constant touch with the Coal Board regarding an investigation of the many items of our claims which are outstanding, and I am pleased to inform you that several of these have been settled.

In connection with our substantial investment in Vacuum Oil Company, I referred last year to the progress made in the construction of the Refinery at Coryton and in the reconstruction of the Compounding and Blending Plants at Birkenhead and Wandsworth. Sufficient progress was made at Coryton for the Distillation Unit of the Refinery to be started up at the beginning of 1953. The Lubricating Oil Units and the Cracking Plant should be in operation at the end of this year. It is only upon the satisfactory operation of these elements that the Refinery project can be said to be completed.

The original project assumed full production from all the units of the Refinery by the beginning of 1953. By reason of delays in the delivery of plant and equipment, and thus in the construction and operation of all the units of the Refinery, we have received no income from Vacuum in respect of the trading year under review. For these and other reasons, we cannot expect any revenue from this direction in the current year. I do, however, look forward to this investment producing a steady income in future years, when the Vacuum organization, with its completed equipment, gets into its stride.

Despite the fact that during the period of Powell Duffryn management of Wankie Colliery Company Ltd., in which we had invested £500,000, production was raised by nearly 50 per cent up to 2,750,000 tons per annum, it was found that the recruitment of suitable supervisory staff to achieve the ultimate output objective was unlikely to be obtainable in sufficient quantity or quality from the United Kingdom.

By mutual consent of all parties concerned, including the Government of Southern Rhodesia, we transferred our interests in the Wankie Colliery Company Ltd., and in Powell Duffryn (Rhodesia) Ltd., to the Anglo American Corporation of South Africa Ltd., the total consideration being the allocation of Ordinary Shares in Rhodesian Anglo American Ltd. of a market value of approximately £750,000. The outcome should be a substantial increase in the value of our investment in the Rhodesias and a much higher current income.

Stephenson Clarke Limited, which is a very important member of the Powell Duffryn Group, continues to expand its activities. Together with its subsidiaries, and more particularly Associated Coal and Wharf Companies Ltd., it has again earned a satisfactory revenue.

The business of Cory Brothers and Company Ltd. continues to thrive despite the fact that because of the wide area of its activities, it meets the full blast of overseas financial upheaval and instability. The Oil Bunkering and Storage Department is doing well and further progress has been made in the Timber Department through our Swedish Company.

Cambrian Wagon and Engineering Company Ltd. has in hand a contract for steel mineral wagons which will keep the Wagon Shop in full employment for the next five years.

Rhymney Engineering Works at Rhymney, Monmouthshire, a joint venture with International Combustion (Holdings) Ltd., is also showing increased activity and good results.

Powell Duffryn Technical Services Ltd. is an organization which does not call for capital investment other than working capital and its earnings so far have been satisfactory.

Recently we were invited, and agreed to join, the very important organization known as the British Newfoundland Corporation, which has been formed by Rothschilds and several leading industrialists for the development of the mineral and other resources of Newfoundland and Labrador. This Corporation is regarded as a most powerful and important body linking British enterprise with Commonwealth development, and it is expected that, with its unlimited opportunities, satisfactory results will be achieved.

The results of the Group as a whole justify a repetition of the same dividend as has been paid in previous years. While the dividend now proposed encroaches slightly on the Carry Forward of the Parent Company, the Carry Forward in the Consolidated Accounts is actually increased.

The report and accounts were adopted.

JOHANNESBURG CONSOLIDATED INVESTMENT CO., LTD.

(Incorporated in the Union of South Africa)

MINING COMPANIES' REPORTS FOR QUARTER ENDED SEPTEMBER 30, 1953

GENERAL REMARKS—The revenue from gold has been calculated on the basis of gold at 246s. 11d. per ounce fine for July and August and 247s. 10d. for September, 1953.

In determining the payable development footage gold has been taken at 248s. 3d. per ounce fine.

The development figures are the actual results of the sampling of development work on reef : no allowance has been made for modifications which may be necessary when computing the ore reserves. 10 and 11 Austin Friars, London, E.C.2. October 16, 1953.

THE EAST CHAMP D'OR GOLD MINING COMPANY LIMITED

(Incorporated in the Union of South Africa)

ISSUED CAPITAL **£259,875**

Crushed **73,000** tons ; yielding **10,599** ounces fine gold

	£	Per ton crushed s. d.	Per oz. fine gold produced s. d.
Revenue from Gold	131,005	35 11	
Working Costs	140,077	38 5	264 4
	9,072	*2 6*	
Sundry Revenue	1,146		
Loss for Quarter	*7,926*		

Sums totalling **£1,541** accrued during the quarter in respect of increased revenue from sales of gold at enhanced prices.

URANIUM PROJECT.—Expenditure during the quarter in connection with the Uranium Project amounted to **£54,532**, making a total to date of **£77,165**, which sum will be met from Loan Funds.

Work on the Project is proceeding.

The **DEVELOPMENT FOOTAGE** sampled totalled **425** feet, and gave the following results : **PAYABLE, 320** feet, having an average value of **12.5** dwt. over **15** inches. **UNPAYABLE, 105** feet, having an average value of **2.5** dwt. over **23** inches.

GOVERNMENT GOLD MINING AREAS (MODDERFONTEIN) CONSOLIDATED LIMITED

(Incorporated in the Union of South Africa)

ISSUED CAPITAL.....**£1,400,000**

Crushed **751,000** tons ; yielding **99,739** ounces fine gold

	£	Per ton crushed s. d.	Per oz. fine gold produced s. d.
Revenue from Gold	1,232,830	32 10	
Working Costs	1,120,116	29 10	224 7
	112,714	3 0	
Sundry Revenue	17,466		
Profit for Quarter	130,180		

In addition to the above, **£12,568** accrued during the quarter in respect of increased revenue from sales of gold at enhanced prices.

The Government's share of profits for the quarter is estimated at **£17,545.**

PYRITE RECOVERY PLANT.—Expenditure during the quarter in connection with the Pyrite Recovery Plant amounted to **£73,110**, making a total to date of **£99,930.**

The erection of the Plant is proceeding.

The **DEVELOPMENT FOOTAGE** sampled totalled **5,940** feet, and gave the following results : **PAYABLE, 3,035** feet, having an average value of **4.9** dwt. over **50** inches. **UNPAYABLE, 2,905** feet, having an average value of **2.1** dwt. over **47** inches.

NEW STATE AREAS LIMITED

(Incorporated in the Union of South Africa)

ISSUED CAPITAL.....**£1,514,037**

Crushed **64,000** tons ; yielding **9,822** ounces fine gold

	£	Per ton crushed s. d.	Per oz. fine gold produced s. d.
Revenue from Gold	121,387	37 11	
Working Costs	123,376	38 6	251 3
	1,989	*0 7*	
Sundry Revenue	5,094		
Profit for Quarter	3,105		

In addition to the above, **£1,489** accrued during the quarter in respect of increased revenue from sales of gold at enhanced prices.

(NOTE : There was no liability in respect of Government's Share of Profits or taxation for the quarter.)

The **DEVELOPMENT FOOTAGE** sampled totalled **385** feet, and gave the following results : **PAYABLE, 230** feet, having an average value of **5.9** dwt. over **31** inches. **UNPAYABLE, 155** feet, having an average value of **4.7** dwt. over **21** inches.

THE RANDFONTEIN ESTATES GOLD MINING COMPANY, WITWATERSRAND, LIMITED

(Incorporated in the Union of South Africa)

ISSUED CAPITAL.....**£4,063,553**

Crushed **920,000** tons ; yielding **115,769** ounces fine gold

	£	Per ton crushed s. d.	Per oz. fine gold produced s. d.
Revenue from Gold	1,431,012	31 1	
Working Costs	1,376,820	29 11	237 10
	54,192	1 2	
Sundry Revenue	21,003		
Profit for Quarter	75,195		

In addition to the above, **£16,736** accrued during the quarter in respect of increased revenue from sales of gold at enhanced prices.

(NOTE : There was no liability in respect of taxation for the quarter.)

The expenditure on Capital Account (other than on the Uranium Project) amounted to **£277.**

URANIUM PROJECT—Expenditure during the quarter in connection with the Uranium Project amounted to **£1,240,174**, making a total to date of **£3,190,560** : the Uranium Loan together with accrued interest totalled **£2,895,101** at September 30, 1953.

Work on the Project is proceeding.

The **DEVELOPMENT FOOTAGE** sampled totalled **7,510** feet, and gave the following results : **PAYABLE, 3,555** feet, having an average value of **5.6** dwt. over **47** inches. **UNPAYABLE, 3,955** feet, having an average value of **2.0** dwt. over **42** inches.

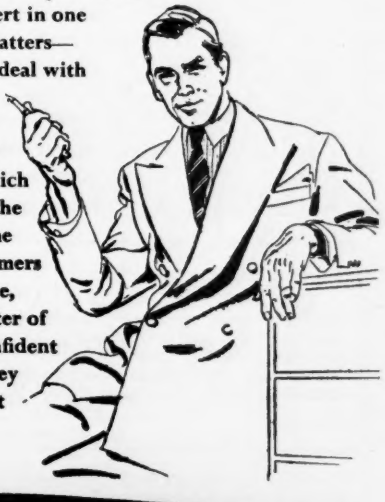
DIVIDENDS

Anglo Ecuadorian Oilfields 10% (November 4)
Bank of British West Africa 3% *i* (November 13)
British Ropes 3% *i* (November 2)
Burmah Oil Co. Ord. 2½% *i* (November 6)
General Tin Investments 6% *i* (November 5)
Komata Reefs Gold 8½% (November 12)
Lower Perak Tin 2.4d. *i* (November 4)
Minerals Separation 20% *i* (November 9)
South African Torbanite 12½% (November 7)
Tongkah Harbour Tin 1s. *i* (November 4)
Transvaal and Delagoa Bay Investment 30%
Union Corporation 6d. *i* *

i interim * tax free

OUT OF YOUR GROUND

There are so many occasions when one realises how difficult it is to be well-informed on all the financial problems which arise in these complicated days. That is why our organisation includes a number of departments which are each expert in one or other of these matters—departments which deal with Foreign Exchange, which understand the complexities of Wills and Trusts, which will not get lost in the labyrinths of Income Tax and so on. Customers may, in consequence, bring to us any matter of this kind, in the confident expectation that they will receive efficient attention and sound advice.



WESTMINSTER BANK LIMITED

BLYVOORUITZICHT GOLD MINING COMPANY, LTD.

(Incorporated in the Union of South Africa)

Extracted from the Annual Report for the Year ended June 30, 1953

AUTHORISED CAPITAL	£3,300,000
ISSUED CAPITAL (24,000,000 Shares of 2/6 each)	£3,000,000

Tonnage milled 1,219,000

		Per ton milled
Working Revenue	£9,322,962	£7 13 0
Working Expenditure	2,960,476	2 8 7
Working Profit	£6,362,486	£5 4 5
Net Profit from Uranium (subject to adjustment)	21,710	
Total	£6,384,196	
Total Profit for the year		£6,425,631
Balance unappropriated at June 30, 1952		1,252,788
Forfeited Dividends		165
		£7,678,584
This amount has been dealt with as follows :—		
Taxation	£2,388,663	
Mineral Lease Consideration	530,107	
		2,918,770
		4,759,814
Dividends declared during the year—No. 14 of 1s. 6d. per share and No. 15 of 1s. 4d. per share		3,400,000
Leaving a balance unappropriated of		£1,359,814

The **Ore Reserve** was re-estimated as at June 30, 1953, as follows :—

Reef	Available			Shaft and Safety Pillars			Total		
	Tons, 000's	Value, Dwt.	Width, Inches	Tons, 000's	Value, Dwt.	Width, Inches	Tons, 000's	Value, Dwt.	Width, Inches
Carbon Leader	5,515	12.3	46.5	1,349	12.9	45.6	6,864	12.4	46.3

Compared with the previous year the available reserve decreased by 12,000 tons, the value was 0.2 dwt. per ton lower and the stope width 0.1 in. greater. The unavailable tonnage increased by 99,000 tons, the value was 0.3 dwt. per ton higher and the stope width unchanged.

The uranium plant was brought into operation during the last quarter of the year, but due to initial plant difficulties and consequent adjustments, the output was seriously restricted.

The full Report and Accounts may be obtained from the London Secretaries, A. MOIR & CO., 4 London Wall Buildings, London, E.C.2.

UGANDA DEVELOPMENT CORPORATION LIMITED

Metallurgist or Mineral Dresser required for Research and Development work in connection with mineral deposits in Uganda. Academic qualifications must include training in experimental ore dressing. Post-graduate practical experience of base metal ore reduction very desirable. The post involves the carrying out of laboratory scale experimental ore dressing tests and advising on the installation and/or operation of ore dressing machinery or equipment in the field. Age limit 40 years. Salary £1,200 - £1,600 per annum, according to qualifications and experience. Accommodation, furnished according to Corporation's scale, provided at maximum rent of 10 per cent of salary, with ceiling of £150 p.a. Three year contract in first instance. Free passages to and from Uganda. Generous leave. Free medical and dental attention. Healthy climate. Moderate income tax. Apply in writing, with full details and copies of three recent testimonials, to London Director, Uganda Development Corporation, 27 Regent Street, London, S.W.1.

MANAGER AND ENGINEER required, the former for field work on alluvial mining in West Africa and the latter for electro-magnetic and electro-static mineral separation in the United Kingdom. Applicants should state age, experience, qualifications, and level of remuneration of interest to them. Box No. 539.

QUALIFIED AND EXPERIENCED MINING ENGINEER required for Portuguese India to take control of the operation of open-cast iron ore mines, also their further development and mechanization. Applications should include full particulars of qualifications and experience, also salary required. Box No. 538.

Mining Men and Matters

Mr. Dudley Thomas Lewis has been appointed chairman, and **Mr. Gordon Henderson Fairmaid** has been appointed director of Pahang Consolidated.

Mr. William Embry Rather, past President of the American Institute of Mining and Metallurgical Engineers, and a director of the U.S. Geological Survey, has been awarded the John Fritz Medal, which is given annually for notable scientific or industrial achievements.

Mr. Walter Vivian Douglas Skrine has been appointed a director of Tronoh Mines and Southern Tronoh Tin Dredging.

Mon. M. van Weyenberg, general manager in Africa for the Union Miniere de Haut Katanga; **Mr. R. L. Prain,** chairman of Rhodesian Selection Trust; and **Mr. K. C. Acutt,** a director of Anglo American Corporation of South Africa have been appointed to fill the three vacancies on the Board of Wankie Colliery.

Mr. A. Hedley Williams has been elected to the board and appointed Chairman of Dominion Reefs (Klerksdorp) in place of **Captain A. H. Moreing** who has relinquished the Chairmanship but has been appointed managing director in succession to **Mr. E. A. Loring,** who retains his seat on the board.

British Memorial Fellowship in Metallurgy.—The British Memorial Fund has offered a Fellowship in Metallurgy, tenable in Victoria, Australia, in the academic year beginning March, 1954. Applicants must be British subjects under 35 years of age on January 1, 1954, who have been resident for at least 10 years in the United Kingdom. They must be graduates, diplomates or lecturers in metallurgy, and must desire to specialize in primary metallurgical processes for concentrates and metals production.

The Fellowship carries a grant of £A1,000 for travel and approximately 10 months' study. The Fellow will work in close liaison with the Professor of Metallurgy at Melbourne University and will spend some time in the ore dressing laboratory of the C.S.I.R.

Application forms and full details can be obtained from Sir John Lienhop, Agent-General for Victoria and Chairman of the British Memorial Fund Committee, Victoria House, Strand, London, W.C.2, to whom completed applications should be sent as soon as possible.

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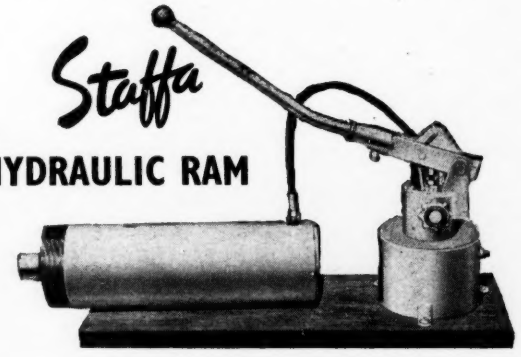

Strength is the big advantage of the hard-wearing STAFFA Hydraulic Ram. Consisting of two units (a leak-proof hydraulic pump and cylinder joined by a pipe), the ram is light and easy to operate. It can be used with machinery in any hydraulic capacity and working time is reduced by our patent two-stage principle. Special accessories are made to adapt it to different types of work.

The rams can develop a maximum working pressure of 5,000 lbs. per square inch and can be supplied at capacities from five to fifty tons, or to special requirements.

For further details write to

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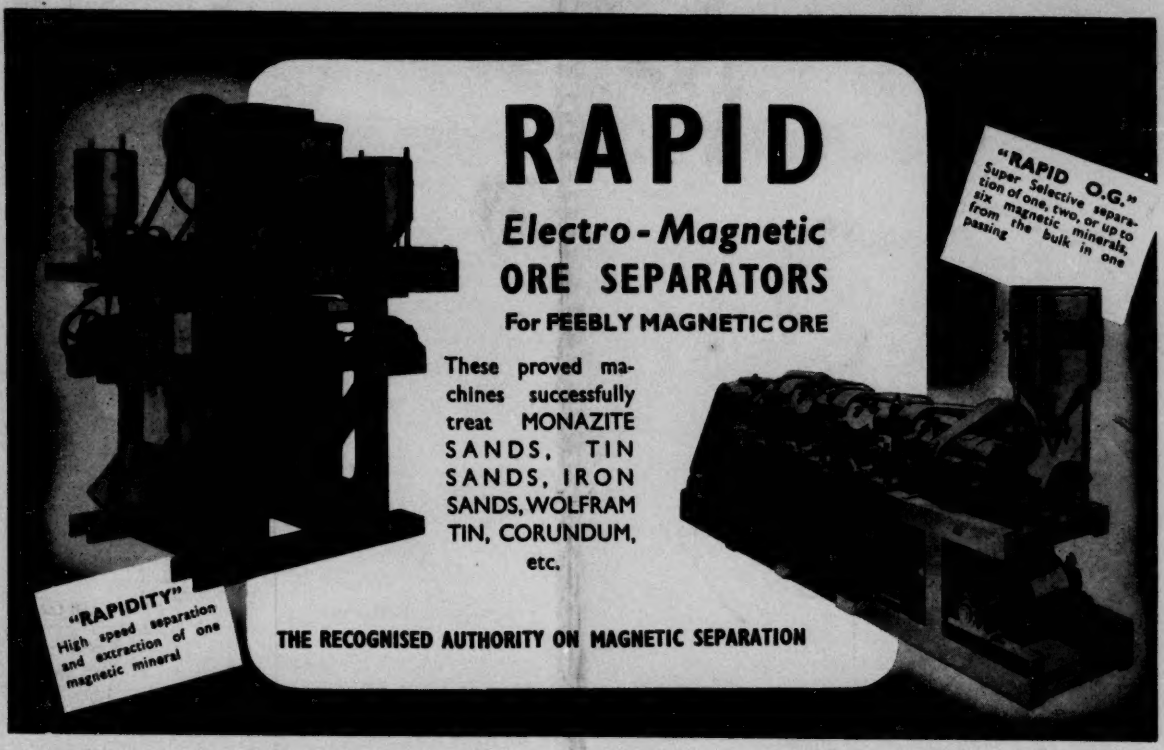
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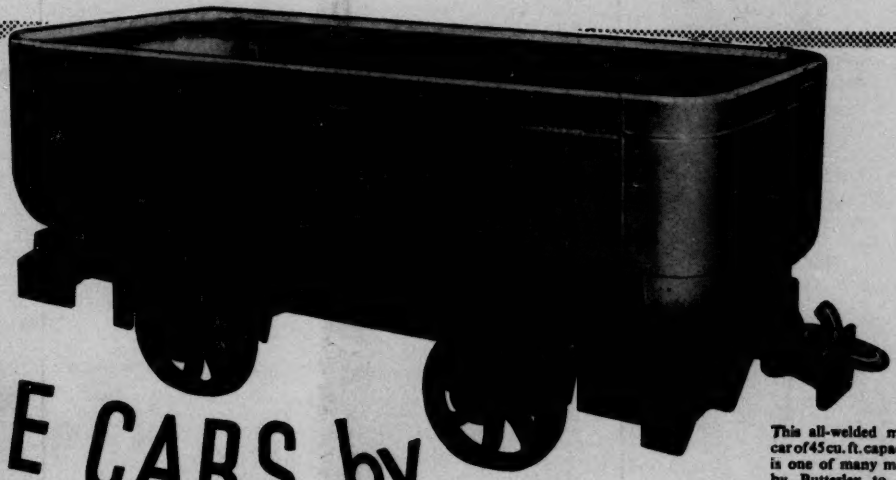

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